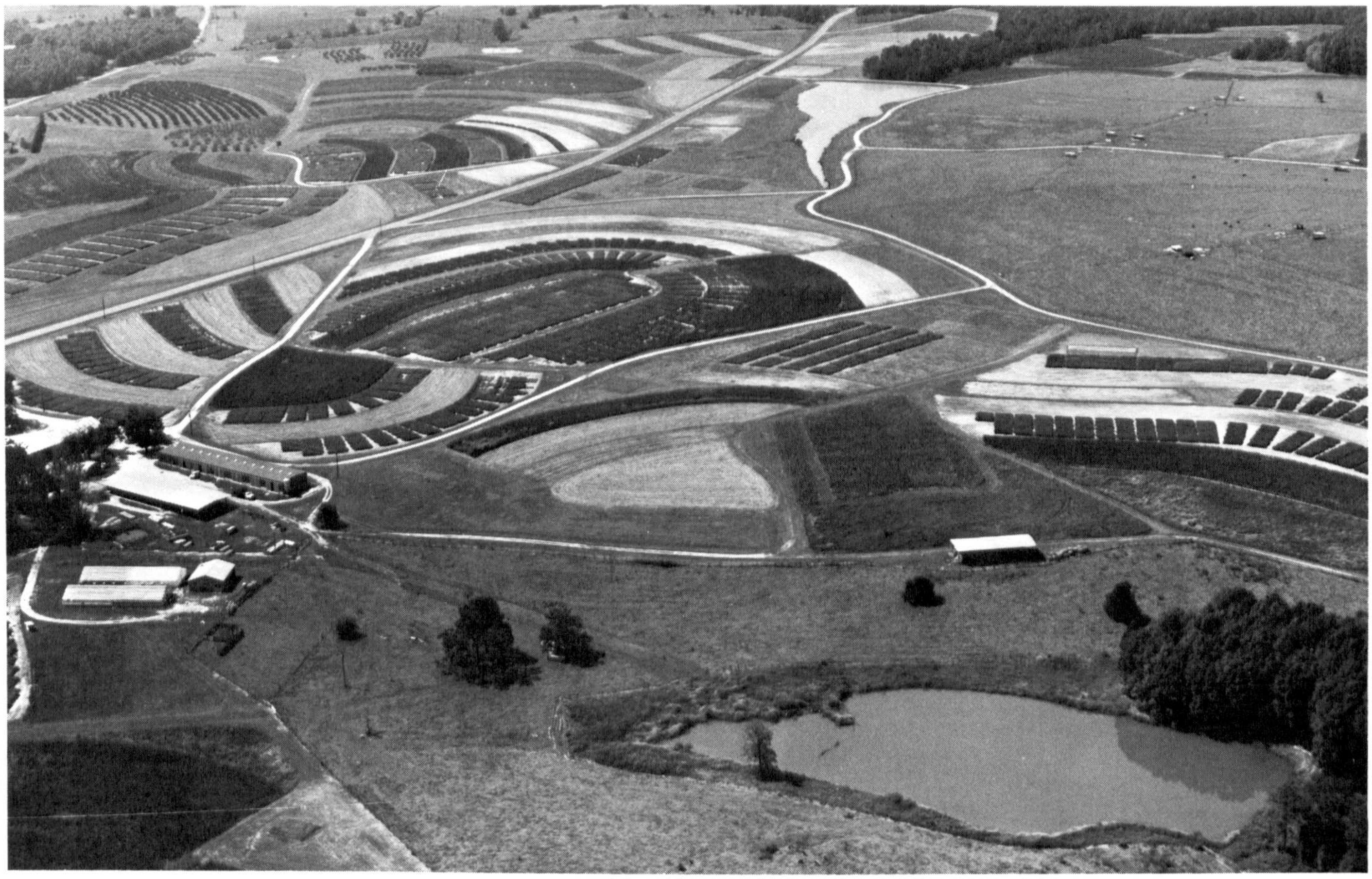
SOIL SURVEY OF

Anderson County, South Carolina



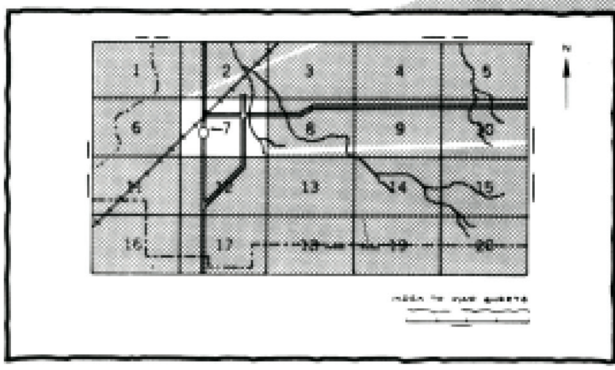
United States Department of Agriculture
Soil Conservation Service

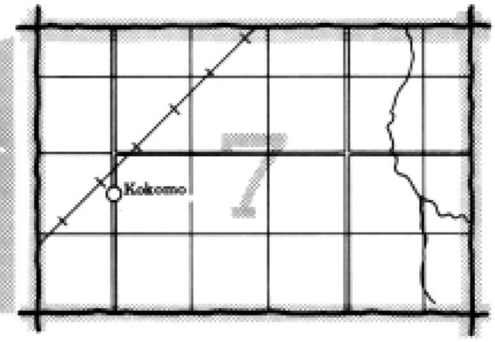
in cooperation with

South Carolina Agricultural Experiment Station
and the
South Carolina Land Resources Conservation Commission

HOW TO USE

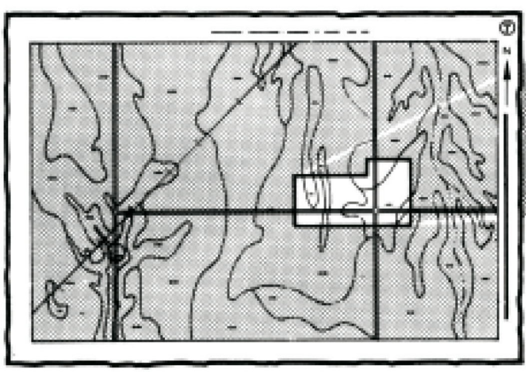
1. Locate your area of interest on the "Index to Map Sheets"

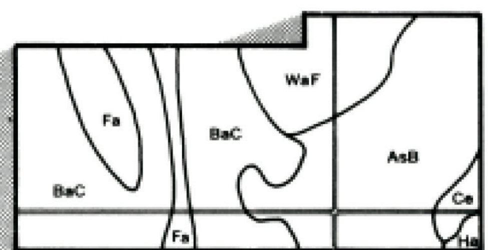




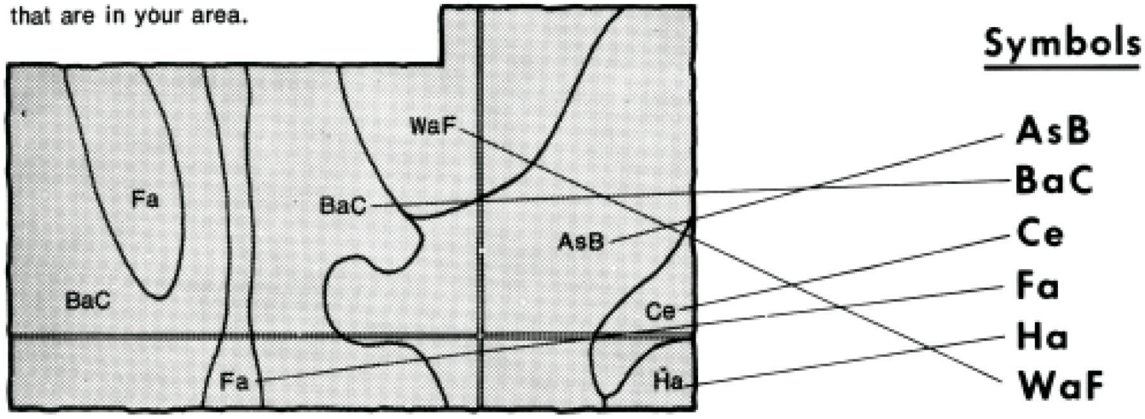
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



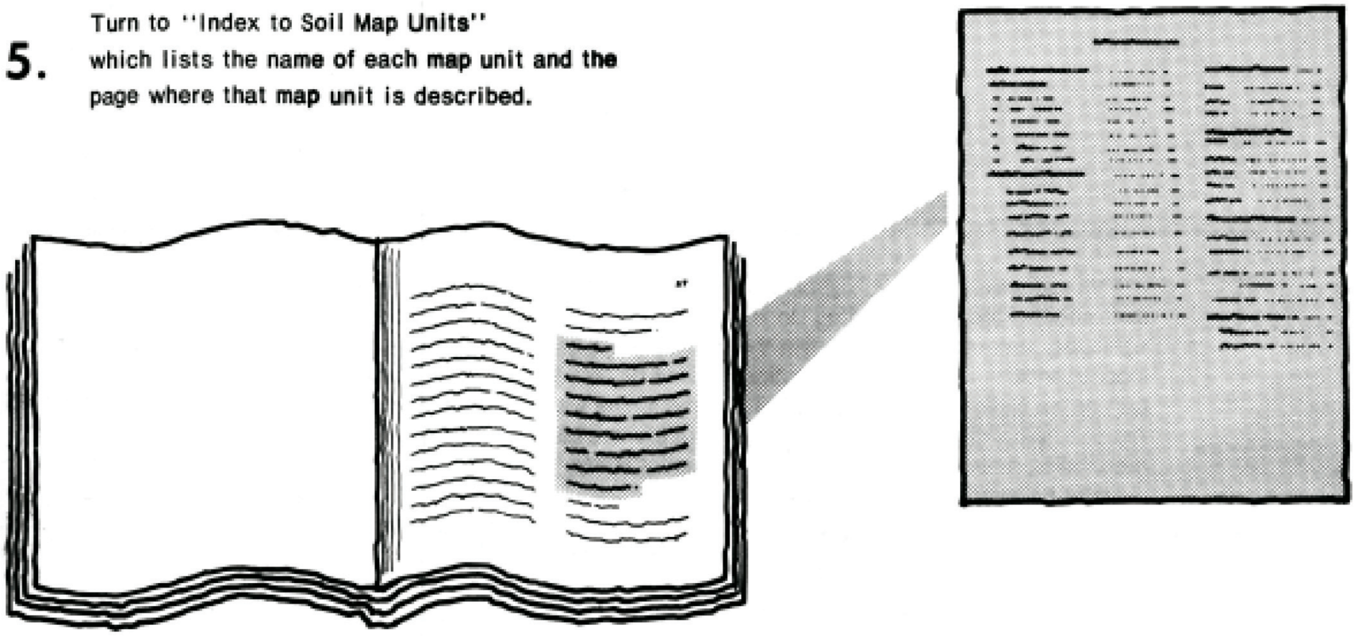


4. List the map unit symbols that are in your area.

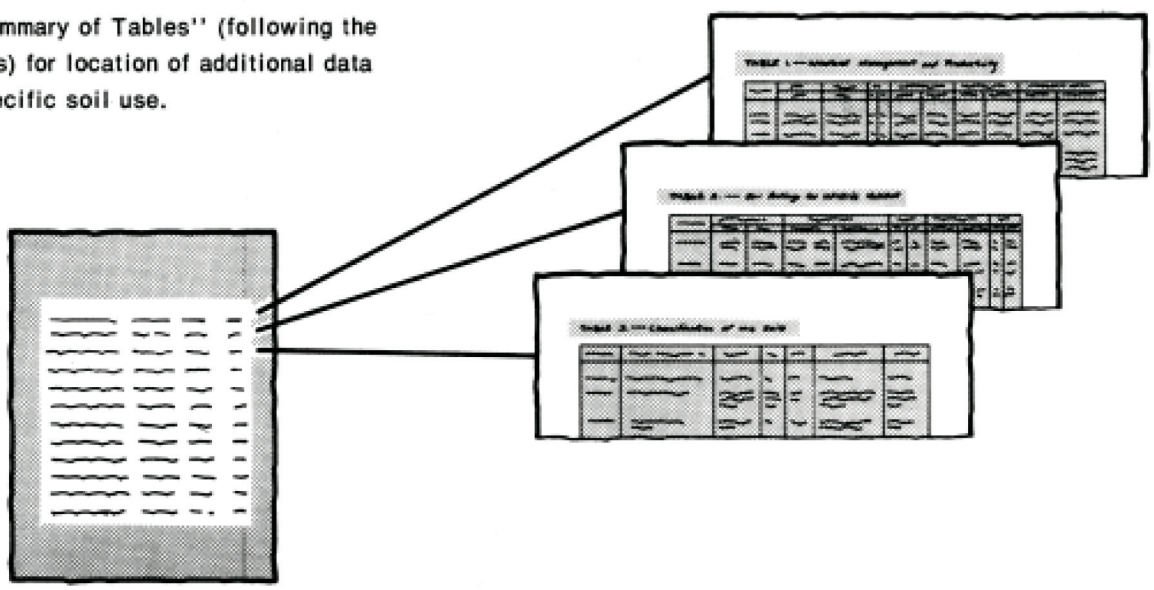


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968-74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, the South Carolina Agricultural Experiment Station, and the South Carolina Land Resources Conservation Commission. It is part of the technical assistance furnished to the Anderson Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Experimental plots follow contour lines on Cecil sandy loam, 2 to 6 percent slopes, at Simpson Station, a part of the South Carolina Agricultural Experiment Station.

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Issued August 1979

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Foreword

The Soil Survey of Anderson County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

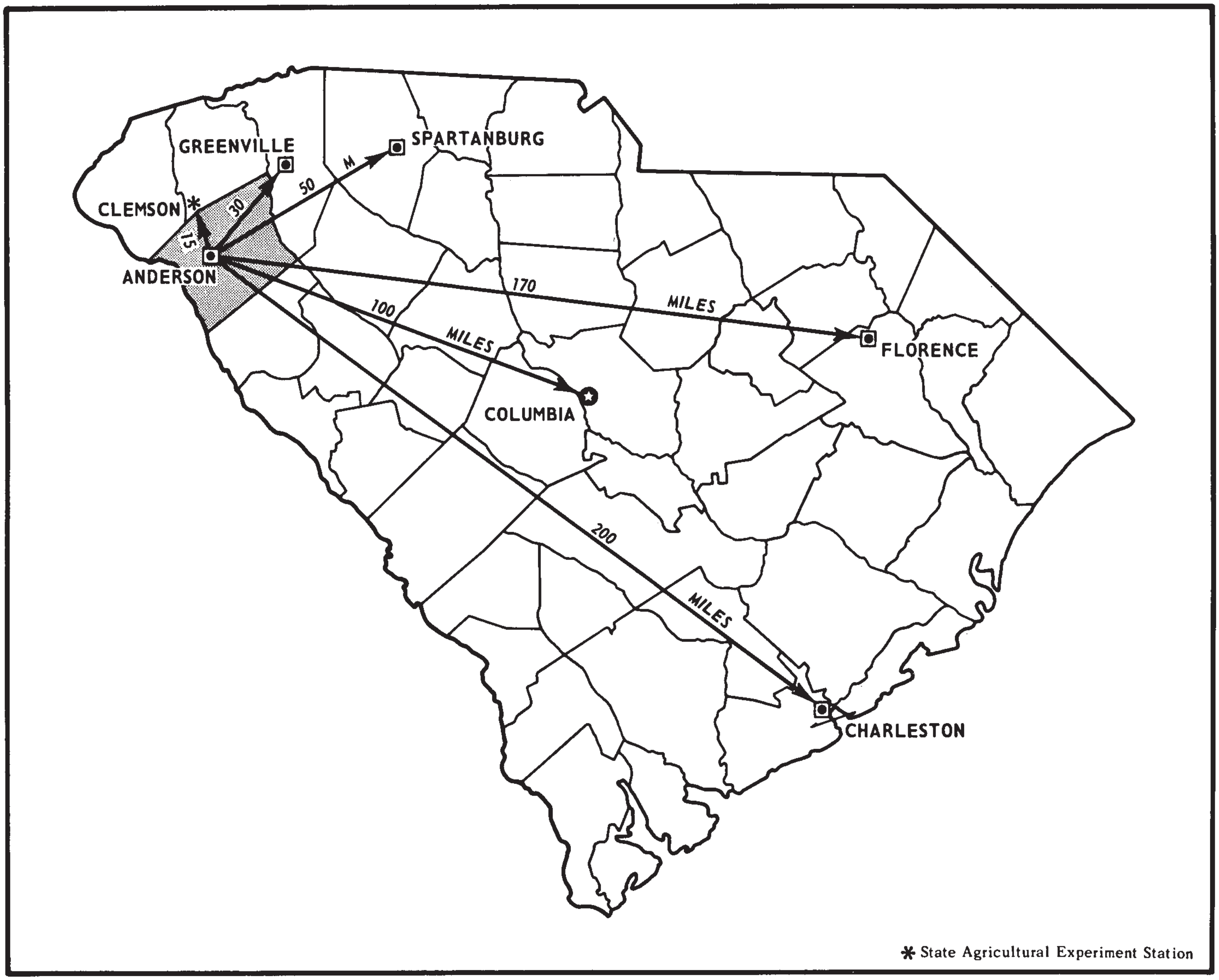
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

State Conservationist
Soil Conservation Service



Location of Anderson County in South Carolina.

SOIL SURVEY OF ANDERSON COUNTY, SOUTH CAROLINA

By Edward C. Herren, Soil Conservation Service

Soils surveyed by H. S. Byrd, R. W. Craft, and E. C. Herren,
Soil Conservation Service, and by W. J. Camp and W. H. Fleming, South Carolina
Land Resources Conservation Commission

United States Department of Agriculture in cooperation with the South Carolina
Agricultural Experiment Station and the South Carolina Land Resources
Conservation Commission

ANDERSON COUNTY is in the northwestern part of South Carolina (see facing page). Anderson, the county seat, has a population of 30,000. The total population of the county is 110,000. The total land area is 473,000 acres, or about 739 square miles.

The county is on the Piedmont Plateau. The elevation ranges from 450 feet on the Savannah River at Anderson and the Abbeville County line to 1,014 feet west of Powdersville near Fairview Church. Most of the acreage is gently sloping, but areas near streams and drainageways are dominantly moderately steep to steep. The flood plains along the rivers and small streams are nearly level and are subject to frequent flooding.

The county was established in 1826. It was named in honor of a popular Revolutionary soldier, Colonel Robert Anderson (*3*).

Natural resources

Soil is the most important resource in the county. The livestock that graze the grass and the crops produced on farms are marketable products derived from the soil.

The county has an abundant supply of water for domestic use and for livestock. Water flows in almost every drainageway. The 23,633 acres of water in Lake Hartwell alone is an adequate supply for future needs.

About 200,000 acres in the county is woodland.

Farming

The first settlers in Anderson County grew mostly cotton, tobacco, wheat, corn, and sweet potatoes and some rice. Sheep were the chief livestock. Tobacco and cotton were the cash crops.

With the coming of the cotton gin, more and more forest was cleared and the land planted to cotton. The soils were not protected from water erosion, and soil erosion became a severe problem. In 1935 the Soil Conservation Service established the Little Beaverdam Creek Demonstration Project Area, which included about 35,000 acres east of Anderson. Complete conservation farming plans were worked out for cooperating farmers in the project area, and some special erosion measures were installed. Realizing the need for future concrete action on such land erosion problems, the farmers and land owners of Anderson, Pickens, and Oconee Counties organized the Upper Savannah Soil Conservation District, one of the first districts organized under the South Carolina Soil Conservation District Law of 1937 (*8*). The Soil Conservation Service now offers technical assistance in each county.

Practically all of the county is in farms. On most of the acreage the plow layer is loamy, and a large acreage is suitable for cotton, corn, grain sorghum, soybeans, pasture, and other crops. The soils most used for cultivated crops are Appling, Cecil, Durham, Hiwassee, and Madison. These soils are well drained, but the more sloping areas are susceptible to erosion. Many areas are protected by grassed waterways. Pasture or woodland is a good use in many of the steeper areas. About 44 percent of the county is used for cropland and pasture; 45 percent for woodland; and 11 percent for urban and other uses.

Most of the farm income is from the sale of livestock and livestock products. Anderson County is first in the State in the production of beef cattle and wheat. The total farm income was about 13 million dollars in 1974.

Climate

By BEN DAVIS, meteorologist, National Oceanic and Atmospheric Administration, United States Department of Commerce, Asheville, N.C.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Anderson, South Carolina, for the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44 degrees F, and the average daily minimum temperature is 34 degrees. The lowest temperature on record, which occurred at Anderson on January 1, 1966, is 0 degrees. In summer the

average temperature is 78 degrees, and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 29, 1952, is 108 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 23 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.94 inches at Anderson on July 18, 1964. Thunderstorms occur on about 45 days each year, and most occur in summer.

Average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 6 inches. On the average, 1 day has at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 60 in summer and 50 in winter. The prevailing wind is from the northeast. Average windspeed is highest, 8 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units, or associations, that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The

kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Soils on flood plains: loamy throughout

Only one association in Anderson County occurs on flood plains. The soils of this association formed in loamy alluvial sediments. Deposits of soil materials are continuously laid down by streams during floods. Recent deposits, generally of medium texture, contain thin strata of sandy, loamy, and clayey material. In places the water table is near the surface 6 months or more in most years.

1. Cartecay-Toccoa-Chewacla association

Nearly level, somewhat poorly drained and well drained soils

This association is on flood plains along major streams and most minor streams throughout the county. It is flooded frequently for short durations. The soils formed in mostly loamy alluvial sediments eroded from upland soils.

This association makes up about 5 percent of the county. It is about 47 percent Cartecay and similar soils, 38 percent Toccoa and similar soils, and 15 percent Chewacla and similar soils.

Cartecay soils occur in intermediate positions on the flood plain. They have a reddish brown fine sandy loam surface layer over yellowish red, reddish brown, brown, and gray sandy loam mottled with shades of gray, yellow, and brown.

Toccoa soils occur at the upper reaches of streams. They have a dark brown or reddish brown loamy sand or sandy loam surface layer over stratified brown, yellowish red, or yellowish brown sandy loam.

Chewacla soils occur in most positions on the flood plain. They have a brown loam or silt loam surface layer over a subsoil of brown, reddish brown, and yellowish brown silty clay loam, clay loam, or sandy clay loam mottled with shades of gray and brown. The underlying material is gray, stratified sandy loam and loamy sand.

This association is suited to pasture and wetland hardwoods. Most of the acreage is pasture or woodland. Wood products are pulpwood and lumber. The association provides suitable habitat for woodland and wetland wildlife. Because of frequent flooding, limitations are severe for dwellings with onsite sewage disposal, industrial sites, and recreational facilities.

Soils of the upland: loamy surface layers and mostly clayey subsoils

The soils of three associations in Anderson County formed in materials weathered from the underlying bedrock of granite, schist, or gneiss. They are dominantly well drained.

2. Madison-Pacolet association

Strongly sloping to steep, dominantly moderately deep, well drained soils

This association occurs as strongly sloping, moderately steep, and steep slopes adjacent to bottom land along the Saluda, Savannah, and Rocky Rivers and their tributaries. It is also near the breaks of Broad Mouth, Barkers, and Wilson Creeks and their tributaries. The soils formed in material weathered from granite or gneiss.

This association makes up about 17 percent of the county. It is about 43 percent Madison soils, 33 percent Pacolet soils, and 24 percent minor soils.

Madison soils are moderately deep to deep and have a reddish brown surface layer. The subsoil is red clay in the upper part and red clay loam in the lower part. It contains common to many flakes of mica.

Pacolet soils are moderately deep and have a yellowish brown sandy loam surface layer. The subsoil is red clay in the upper part and red clay loam in the lower part.

Minor in this association are Cecil, Chewacla, Gwinnett, Hiwassee, Cartecay, and Toccoa soils. Cecil, Gwinnett, and Hiwassee soils are deep to moderately deep and are well drained. The gently sloping to sloping Cecil and Hiwassee soils are on ridges. The steeper Gwinnett soils are adjacent to streams. Chewacla, Cartecay, and Toccoa soils occupy long drainageways adjacent to the uplands. They are somewhat poorly drained to well drained.

About 90 percent of this association is forest. The rest is pasture or idle or in nonfarm use. The association is suited to woodland and provides suitable habitat for woodland wildlife. Because of the steep slopes, limitations are severe for dwellings with onsite sewage disposal, industrial sites, and recreational facilities. Most farms extend into other associations.

3. Cecil-Hiwassee-Madison association

Gently sloping to strongly sloping, moderately deep to deep, well drained soils

This association occurs throughout the county as broad, gently sloping ridges and medium, sloping ridges. It is dissected by a few long, shallow, well developed drainageways.

This association makes up about 73 percent of the county. It is about 66 percent Cecil soils, 13 percent Hiwassee soils, 13 percent Madison soils, and 8 percent minor soils.

Cecil soils are deep, well drained, and gently sloping to strongly sloping. The gently sloping soils are on broad ridges. The strongly sloping soils are adjacent to drainageways. The surface layer is typically brown sandy loam. In eroded areas it is red or yellowish red clay loam or sandy clay loam. The subsoil is red clay. In places it is mottled with strong brown and yellowish brown.

Hiwassee soils also are deep, well drained, and gently sloping to strongly sloping. They are adjacent to drainageways. The surface layer is typically dark reddish brown sandy loam. In eroded areas it is dark red or dark reddish brown clay loam. The subsoil is dark red clay.

Madison soils are moderately deep to deep, well drained, and gently sloping to strongly sloping. The gently sloping soils are on broad ridges. The strongly sloping soils are adjacent to drainageways. The surface layer is typically reddish brown sandy loam. In eroded areas it is red clay loam or sandy clay loam. The subsoil is red clay to clay loam containing common to many flakes of mica.

Minor in this association are Appling, Cartecay, Chewacla, Cataula, Durham, Gwinnett, Pacolet, and Toccoa soils. The gently sloping and sloping, well drained Appling, Cataula, and Durham soils are on ridges. The nearly level, somewhat poorly drained and well drained Cartecay, Chewacla, and Toccoa soils are on narrow flood plains. The strongly sloping to steep, well drained Gwinnett and Pacolet soils are adjacent to drainageways.

This association is suited to cultivated crops and is well suited to pasture and woodland. It is suited as habitat for openland wildlife, suited to well suited as habitat for woodland wildlife, and poorly suited as habitat for wetland wildlife.

Most of the acreage is pastured, cultivated, or forested. The rest provides homesites or is used for nonfarm purposes. On most of the association, limitations are moderate for dwellings with onsite sewage disposal, industrial sites, and recreational facilities.

4. Cecil-Appling-Durham association

Gently sloping to sloping, deep, well drained soils

This association occurs as broad, gently sloping ridges and medium, sloping ridges. It is dissected by a few long, shallow drainageways in the northwestern and southeastern parts of the county.

This association makes up about 5 percent of the county. It is about 47 percent Cecil soils, 29 percent Appling soils, 5 percent Durham soils, and 19 percent minor soils.

Cecil soils are well drained and gently sloping to sloping. The gently sloping soils are on broad ridges. The sloping soils are adjacent to drainageways. The surface layer is typically brown sandy loam. In eroded areas it is red or yellowish red clay loam or sandy clay loam. The subsoil is red clay. In places it is mottled with strong brown and yellowish brown.

Appling soils are well drained and gently sloping. They are on broad ridges and short breaks adjacent to shallow drainageways. The surface layer is brown sandy loam. The upper part of the subsoil is strong brown or reddish yellow clay. The lower part is yellowish red clay mottled with brown and red.

Durham soils are well drained and gently sloping. They occupy the higher parts of the broad ridges. The surface layer is brown sandy loam. The upper part of the subsoil is yellowish brown sandy clay loam. The lower part is yellowish brown sandy clay loam mottled with strong brown and yellowish red.

Minor in this association are Cartecay, Chewacla, Cataula, Hiwassee, and Toccoa soils. The nearly level, somewhat poorly drained and well drained Cartecay, Chewacla, and Toccoa soils are on flood plains. Cataula soils are moderately deep over a fragipan. Hiwassee soils are deep and well drained.

This association is suited to cultivated crops, is well suited to pasture and woodland, and provides suitable habitat for openland and woodland wildlife.

Most of the acreage is pastured, cultivated, or forested. The rest provides homesites or is used for other nonfarm purposes. On most of the association, limitations are moderate for dwellings with onsite sewage disposal, industrial sites, and recreational facilities.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Cecil sandy loam, 2 to 6 percent slopes, is one of several phases within the Cecil series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area in-

cludes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Cartecay-Chewacla complex is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

ApB—Appling sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 4 to about 150 acres.

Typically, the surface layer is brown sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 3 inches thick. The upper part of the subsoil is strong brown and yellowish red clay. The lower part is mottled yellowish red, yellowish brown, and red clay loam to a depth of about 52 inches. Below this to a depth of 6 feet or more is soft weathered granite, gneiss, or schist rock.

Included with this soil in mapping are some soils, in small concave areas and along narrow drainageways, that are somewhat poorly drained. Also included are a few small areas where slopes are greater than 6 percent and a few small intermingled areas of Cecil, Durham, and Madison soils. The included soils make up about 5 to 15 percent of this map unit, but separate areas generally are less than 1 acre.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid in all horizons, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for hay, pasture, row crops, and small grains (fig. 1). Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, terraces, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has high potential for most urban uses. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIe-6; woodland group 3o.

ApC—Appling sandy loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on ridgetops and along slopes adjacent to and at heads of shallow drainageways. Slopes generally are smooth and convex. Individual areas are 4 to about 80 acres.

Typically, the surface layer is brown sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 3 inches thick. The upper part of the subsoil is strong brown and yellowish red clay. The lower part is mottled yellowish red, yellowish brown, and red clay loam to a depth of about 52 inches. Below this to a depth of 6 feet or more is soft weathered granite, gneiss, or schist rock.

Included with this soil in mapping are some soils, in small concave areas and along narrow drainageways, that are somewhat poorly drained. Also included are a few small areas where slopes are less than 6 percent or greater than 10 percent and a few small intermingled areas of Cecil and Madison soils. The included soils make up about 10 to 20 percent of this map unit, but separate areas generally are less than 1 acre.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid in all horizons, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains. Its potential is limited because of the slope. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, terraces, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIIe-5; woodland group 3o.

Ca—Cartecay-Chewacla complex. This complex consists of areas of nearly level Cartecay and Chewacla soils that are so intermingled that they could not be separated at the scale selected for mapping. It occurs as areas of 10 to about 150 acres, about 100 to 400 feet wide, on first bottoms along the larger streams. Individual areas of each soil are 1/8 acre to about 10 acres.

Cartecay fine sandy loam makes up about 40 to 60 percent of each mapped area. Typically, the surface layer is reddish brown fine sandy loam about 10 inches thick. The

upper part of the underlying material is yellowish red or reddish brown sandy loam with gray mottles. The lower part to a depth of about 47 inches is thin strata of gray sand, loamy sand, and silt loam.

This soil is low in natural fertility and medium in organic matter content. It is slightly acid to strongly acid throughout, except in a surface layer that has been limed. Permeability is moderately rapid, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

Chewacla loam makes up about 25 to 35 percent of each mapped area. Typically, the surface layer is brown loam about 5 inches thick. The upper part of the subsoil is brown and dark brown clay loam and sandy clay loam with strong brown, grayish brown, pale brown, and gray mottles. The lower part to a depth of about 45 inches is gray silty clay loam and sandy clay loam with strong brown and grayish brown mottles. The underlying material to a depth of about 70 inches is gray loamy sand with dark gray mottles.

This soil is medium in natural fertility and organic matter content. It is slightly acid to strongly acid in all horizons, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked within a moderate range of moisture conditions. The root zone is deep and can be easily penetrated by plant roots.

This complex has high potential for row crops, small grains, hay, pasture, and vegetables. Its potential is limited because of wetness and flooding (fig. 2). Good tilth is easily maintained by returning crop residue to the soil.

This complex has very low potential for urban uses. Wetness and flooding are severe limitations that are very difficult to overcome.

This complex has very high potential for loblolly pine, sweetgum, yellow-poplar, cottonwood, green ash, and southern red oak. The use of equipment is restricted for short periods during wet seasons.

This complex has high potential for woodland wildlife habitat and moderate potential for recreation use. Capability unit IIIw-7; woodland groups 2w and 1w.

CbB—Cataula sandy loam, 2 to 6 percent slopes. This well drained, gently sloping soil is on broad ridgetops, adjacent to shallow drainageways, and at heads of drainageways. Slopes are smooth and generally convex. Individual areas are 4 to about 100 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The upper part of the subsoil is red clay with mottles of strong brown and reddish yellow. The middle part is a fragipan about 15 inches thick with thin alternating layers of red clay loam and brownish yellow and strong brown clay. The lower part is red clay loam with yellowish red, strong brown, and reddish yellow mottles. It extends to a depth of about 56 inches. Below this to a depth of 5 feet or more is yellowish red and red weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are greater than 6 percent. In a few small areas the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Cecil soils. The included soils make up 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is slow, and the available water capacity is low. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately shallow. It is restricted by the brittle fragipan.

This soil has medium potential for row crops and small grains. Its potential is limited because of the restricted root penetration in the fragipan. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine, yellow-poplar, and southern red oak. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The brittle pan and low strength are limitations but can be overcome by good design and careful installation. The soil percs slowly, primarily because of the brittle layer. Slow percolation is a severe limitation for septic tank absorption fields and is very difficult to overcome. Capability unit IIIe-7; woodland group 3o.

CbC—Cataula sandy loam, 6 to 10 percent slopes. This well drained, sloping soil is on narrow ridges, adjacent to drainageways, and at heads of drainageways. Slopes are smooth and convex. Individual areas are 4 to about 50 acres.

Typically, the surface layer is dark brown sandy loam about 5 inches thick. The upper part of the subsoil is red clay with mottles of strong brown and reddish yellow. The middle part is a fragipan about 15 inches thick with thin alternating layers of red clay loam and brownish yellow and strong brown clay. The lower part is red clay loam with yellowish red, strong brown, and reddish yellow mottles. It extends to a depth of about 56 inches. Below this to a depth of 5 feet or more is yellowish red and red weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are less than 6 percent and a few where slopes are greater than 10 percent. In a few small areas the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Cecil soils. The included soils make up 10 to 20 percent of this map unit, but separate areas are generally less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is slow, and the available water capacity is low. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately shallow. It is restricted by the brittle fragipan.

This soil has medium potential for row crops and small grains. Its potential is limited because of the slope and the restricted root penetration in the fragipan. It has medium potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine, yellow-poplar, and southern red oak. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The brittle pan and low strength are limitations but can be overcome by good design and careful installation. The soil percs slowly, primarily because of the brittle layer. Slow percolation is a severe limitation for septic tank absorption fields and is very difficult to overcome. Capability unit IVe-4; woodland group 3o.

CcC2—Cataula clay loam, 6 to 10 percent slopes, eroded. This well drained, sloping soil is on narrow ridges, adjacent to drainageways, and at heads of drainageways. Slopes are smooth and convex. Individual areas are 4 to about 30 acres.

Typically, the surface layer is red clay loam about 3 inches thick. The upper part of the subsoil is red clay with mottles of strong brown and reddish yellow. The middle part is a fragipan about 15 inches thick with thin alternating layers of red clay loam and brownish yellow and strong brown clay. The lower part is red clay loam with yellowish red, strong brown, and reddish yellow mottles. It extends to a depth of about 56 inches. Below this to a depth of 5 feet or more is yellowish red and red weathered granite, gneiss, and schist rock.

Included with this soil in mapping are a few small areas where slopes are less than 6 percent and a few where slopes are greater than 10 percent. In a few small areas the surface layer is sandy loam or sandy clay loam and in some areas shallow gullies have formed. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Cecil soils. The included soils make up 10 to 20 percent of this map unit, but separate areas are generally less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is slow, and the available water capacity is low. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is moderately shallow because of the eroded surface layer and the brittle fragipan.

This soil has very low potential for row crops and small grains. Its potential is limited because of the eroded surface layer and the restricted root penetration in the fragipan. It has medium potential for hay and pasture.

This soil has low potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The brittle pan and low strength are limitations but can be overcome by good design and careful installation. The soil percs slowly, primarily because of the brittle layer. Slow percolation is a severe limitation for septic tank absorption fields and is very difficult to overcome. Capability unit VIe-1; woodland group 5c.

CdB—Cecil sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridges adjacent to drainageways. Slopes are smooth and convex. Individual areas are 4 to about 500 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are greater than 6 percent. In a few small areas the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Appling, Cataula, Hiwassee, and Madison soils. The included soils make up 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops and small grains (fig. 3). It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine, yellow-poplar, and northern red oak. There are no significant limitations in woodland use and management.

This soil has high potential for most urban uses. The low strength is a limitation but can easily be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIe-6; woodland group 3o.

CdC—Cecil sandy loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on narrow ridges and adjacent to drainageways. Slopes are smooth and convex. Individual areas are 4 to about 100 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, and schist rock.

Included with this soil in mapping are a few small areas where slopes are less than 6 percent and a few small areas where slopes are greater than 10 percent. In a few small areas the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Appling, Cataula, Hiwassee, and Madison soils. The included soils make up 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine, yellow-poplar, and northern red oak. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The low strength and slope are limitations, but can be easily overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIIe-5; woodland group 3o.

CdD—Cecil sandy loam, 10 to 15 percent slopes. This deep, well drained, strongly sloping soil is adjacent to and at the heads of medium and larger drainageways. Slopes are smooth and convex. Individual areas are 4 to about 30 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are less than 10 percent and a few small areas where slopes are greater than 15 percent. In a few small areas the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Cataula, Madison, and Hiwassee soils. The included soils make up 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has low potential for row crops and small grains. It has a medium potential for hay and pasture. Its potential is limited because of the strong slopes. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine, yellow-poplar, and northern red oak. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 3o.

CeB2—Cecil clay loam, 2 to 6 percent slopes, eroded. This deep, well drained, gently sloping soil is on medium and narrow ridges and adjacent to drainageways. Slopes are smooth and convex. Individual areas are 4 to about 30 acres.

Typically, the surface layer is red clay loam about 4 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are greater than 6 percent. In a few small areas the surface layer is sandy loam or sandy clay loam and in some small areas shallow gullies have formed. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Cataula, Madison, and Hiwassee soils. The included soils make up 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has poor tilth and can be worked within

only a narrow range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops, small grains, hay, and pasture. Its potential is limited because of the eroded surface layer. The tilth can be improved by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The low strength is a limitation but can easily be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIIe-5; woodland group 4c.

CeC2—Cecil clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, sloping soil is on narrow ridges, adjacent to drainageways, and at heads of drainageways. Slopes are smooth and convex. Individual areas are 4 to about 50 acres.

Typically, the surface layer is red clay loam about 4 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included with this soil in mapping are a few small areas where slopes are less than 6 percent and a few small areas where slopes are greater than 10 percent. In a few small areas the surface layer is sandy loam or sandy clay loam and in some small areas shallow to deep gullies have formed. These areas are 1/8 acre to 3 acres. Also included are a few small intermingled areas of Madison and Pacolet soils. The included soils make up 5 to 15 percent of this map unit, but separate areas generally are less than 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains, but it has high potential for hay and pasture. Its potential is limited because of slope and the eroded surface layer. The tilth can be improved by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The low strength is a limitation but can easily be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 4c.

CmB—Cecil-Urban land complex, 2 to 6 percent slopes. This complex consists of areas of Cecil soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. It occurs within the cities and suburbs of Anderson, Belton, Iva, and Pendleton and in a few large developments throughout the county.

Cecil soils are in all areas and make up about 30 to 50 percent of the complex. Typically, the surface layer is brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Urban land is made up of areas that have been excavated, filled, covered by buildings or pavement, or otherwise disturbed by man. Uncovered areas that have been excavated or filled are generally loamy, but the texture may be highly variable within short distances. About 70 to 85 percent of Urban land is covered by pavement or industrial, commercial, or residential buildings.

Included in this complex are a few small areas where slopes are greater than 6 percent. These areas are 1 acre to 5 acres. Also included are a few small intermingled areas of Madison and Hiwassee soils. The included soils make up 5 to 10 percent of this map unit, but separate areas are generally less than 3 acres.

This map unit is not used for farming, other than small vegetable gardens. It has medium potential for home gardens, lawn grasses, trees, and shrubs. It has moderate limitations for urban uses. Onsite investigation is needed for all uses. Because little or no rainfall is absorbed, runoff is much greater than in comparable areas of Cecil sandy loam or similar soils. Capability unit not assigned. Cecil soil, woodland group 3o.

CmC—Cecil-Urban land complex, 6 to 10 percent slopes. This complex consists of areas of Cecil soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. It occurs within the cities and suburbs of Anderson, Belton, and

Pendleton and in a few large developments throughout the county.

Cecil soils are in all areas and make up about 30 to 50 percent of the complex. Typically, the surface layer is brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay. The lower part is red clay loam with reddish yellow mottles to a depth of about 53 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

Urban land is made up of areas that have been excavated, filled, covered by buildings or pavement, or otherwise disturbed by man. Uncovered areas that have been excavated or filled are generally loamy, but the texture may be highly variable within short distances. About 70 to 85 percent of Urban land is covered by pavement or industrial, commercial, or residential buildings.

Included in this complex are a few small areas where slopes are less than 6 percent and a few small areas where slopes are greater than 10 percent. These areas are 1 acre to 5 acres. Also included are a few small intermingled areas of Madison and Hiwassee soils. The included soils make up 5 to 10 percent of this map unit, but separate areas are generally less than 3 acres.

This map unit is not used for farming, other than small vegetable gardens. It has medium potential for home gardens, lawn grasses, trees, and shrubs. It has moderate limitations for urban uses. Onsite investigation is needed for all uses. Because little or no rainfall is absorbed, runoff is much greater than in comparable areas of Cecil sandy loam or similar soils. Capability unit not assigned. Cecil soil, woodland group 3o.

DuB—Durham sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridges of the Piedmont Upland. Slopes are smooth. Some are convex, and some are concave. Individual areas are 4 to about 40 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsurface layer is pale brown sandy loam about 7 inches thick. The upper part of the subsoil is yellowish brown sandy clay loam with strong brown and yellowish red mottles. The lower part is mottled yellowish brown, strong brown, and yellowish red sandy clay loam to a depth of about 42 inches. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included with this soil in mapping are soils, in small concave areas and along narrow drainageways, that are somewhat poorly drained. Also included are a few small areas where slopes are greater than 6 percent and a few small intermingled areas of Appling and Cecil soils. The included soils make up about 5 to 15 percent of this map unit, but separate areas generally are less than 1 acre.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid in all horizons, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops, small grains, hay, and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, terraces, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has high potential for most urban uses. Capability unit IIe-6; woodland group 3o.

GtE—Gwinnett sandy loam, 15 to 25 percent slopes. This moderately deep soil over saprolite is well drained. It is adjacent to the medium and large streams of the Piedmont Upland. Slopes are smooth, short, and convex. Individual areas are 4 to about 70 acres.

Typically, the surface layer is dark reddish brown sandy loam about 3 inches thick. The subsoil is dark red clay to a depth of about 36 inches. Below this to a depth of 5 feet or more is weathered intermingled dark-colored gneiss and schist rock.

A few small areas where slopes are less than 15 percent or greater than 25 percent are included. Also included are a few small areas where the surface layer is clay loam. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep.

This soil is not suited to row crops or small grains. It has low potential for hay and pasture. Its potential is limited because of the moderately steep slopes. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Because of the very severe erosion hazard, this soil should be cultivated only in establishing permanent pasture. It should be wooded or under permanent sod.

This soil has medium potential for loblolly pine and yellow-poplar. The moderately steep slopes are moderate limitations in managing the tree crop.

This soil has low potential for urban uses. Its potential is limited because of the moderately steep slopes.

This soil has medium potential for woodland wildlife habitat. Capability unit VIe-2; woodland group 3r.

GtF—Gwinnett sandy loam, 25 to 40 percent slopes. This moderately deep soil over saprolite is well drained. It is adjacent to the medium and large streams of the

Piedmont Upland. Slopes are short, smooth, and convex. Individual areas are 4 to about 70 acres.

Typically, the surface layer is dark reddish brown sandy loam about 3 inches thick. The subsoil is dark red clay to a depth of about 36 inches. Below this to a depth of 5 feet or more is weathered intermingled dark-colored gneiss and schist rock.

A few small areas where slopes are less than 25 percent or greater than 40 percent are included. Also included are a few small areas where the surface layer is clay loam. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through strongly acid throughout. Permeability is moderate, and the available water capacity is medium. The root zone is moderately deep.

This soil is not suited to row crops, small grains, hay, or pasture. It should be wooded.

This soil has medium potential for loblolly pine and yellow-poplar. The steep slopes are moderate limitations in managing the tree crop.

This soil has very low potential for urban uses. Its potential is limited because of the steep slopes.

This soil has medium potential for woodland wildlife habitat. Capability unit VIIe-2; woodland group 3r.

HaB—Hiwassee sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad and medium ridges of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 4 to about 150 acres.

Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red clay to a depth of about 62 inches. Below this to a depth of 5 feet or more is weathered intermingled dark-colored gneiss or schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil and Madison soils. These included soils make up about 10 to 20 percent of this map unit, but separate areas generally are less than 3 acres. Also included in a few places are small areas where slopes are greater than 6 percent and small areas where the surface layer is sandy clay loam, clay loam, or loam. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has high potential for row crops, small grains, hay, and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, terraces, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management (fig. 4).

This soil has high potential for most urban uses. The low strength is a limitation but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIe-6; woodland group 3o.

HaC—Hiwassee sandy loam, 6 to 10 percent slopes. This deep, well drained soil is on ridges and side slopes adjacent to small and medium streams and at heads of drainageways in the Piedmont Upland. Slopes are smooth and convex. Individual areas are 4 to about 80 acres.

Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red clay to a depth of about 62 inches. Below this to a depth of 70 inches or more is weathered intermingled dark-colored gneiss or schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil and Madison soils. The included soils make up about 10 to 20 percent of the map unit, but separate areas generally are less than 3 acres. Also included are a few small areas where slopes are less than 6 percent or greater than 10 percent and a few small areas where the surface layer is sandy clay loam, clay loam, or loam. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains. Its potential is limited because of the slope. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, terraces, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIIe-5; woodland group 3o.

HaD—Hiwassee sandy loam, 10 to 15 percent slopes. This deep, well drained, strongly sloping soil is adjacent to the medium and larger streams. Slopes are short, smooth, and convex. Individual areas are 4 to about 30 acres.

Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is dark red

clay to a depth of about 62 inches. Below this to a depth of 70 inches or more is weathered intermingled dark-colored gneiss or schist rock.

Included in mapping are a few small areas where slopes are less than 10 percent or greater than 15 percent. Also included are a few small areas where the surface layer is sandy clay loam or clay loam. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has low potential for row crops and small grains. It has medium potential for hay and pasture. Its potential is limited because of the strong slopes. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

This soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 3o.

HwC2—Hiwassee clay loam, 6 to 10 percent slopes, eroded. This deep, well drained soil is on ridges and slopes adjacent to small and medium streams. Slopes are smooth and convex. Individual areas are 4 to about 50 acres.

Typically, the surface layer is dark red clay loam about 3 inches thick. The subsoil is dark red clay to a depth of about 62 inches. Below this to a depth of 70 inches or more is weathered intermingled dark-colored gneiss or schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil and Madison soils. The included soils make up about 10 to 20 percent of the mapping unit, but separate areas generally are less than 3 acres. Also included are a few small areas where slopes are less than 6 percent or greater than 10 percent, small areas where the surface layer is sandy loam or sandy clay loam, and small areas where shallow to deep gullies have formed. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and available water capacity is medium. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains, but it has a high potential for hay and pasture. Its potential is limited because of the eroded surface layer. The tilth can be improved by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The low strength is a limitation but can easily be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 4c.

HwD2—Hiwassee clay loam, 10 to 15 percent slopes, eroded. This deep, well drained, strongly sloping soil is adjacent to the medium and larger streams of the Piedmont Upland. Slopes are short, smooth, and convex.

Typically, the surface layer is dark reddish clay loam about 3 inches thick. The subsoil is dark red clay to a depth of about 62 inches. Below this to a depth of 70 inches or more is weathered intermingled dark-colored gneiss or schist rock.

Included in mapping are a few small areas where slopes are less than 10 percent or greater than 15 percent, small areas where the surface layer is sandy loam or sandy clay loam, and small areas where shallow to deep gullies have formed. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is slightly through very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is medium. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is deep and is easily penetrated by roots.

This soil has low potential for row crops and small grains, but it has a medium potential for hay and pasture. The potential is limited because of the eroded surface layer and the strong slopes.

The soil has medium potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit VIe-2; woodland group 4c.

MaB—Madison sandy loam, 2 to 6 percent slopes. This moderately deep to deep soil over saprolite is well drained. It is on broad ridges and slopes adjacent to small and medium streams. Slopes are smooth and convex. Individual areas are 10 to about 300 acres.

Typically, the surface layer is reddish brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay, and the lower part is red clay loam to a depth of about 34 inches. Below this to a depth of 5 feet or more is weathered quartz-mica-schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil, Hiwassee, and Appling soils. These included soils make up 10 to 20 percent of the map unit, but separate areas generally are less than 3 acres. Also included are small areas where the subsoil is less than 35 percent clay, small areas where slopes are greater than 6 percent, and small areas where the surface layer is clay loam or sandy clay loam. These small areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep or moderately deep and is easily penetrated by plant roots.

This soil has high potential for row crops, small grains, hay, and pasture (fig. 5). Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has high potential for most urban uses. The low strength is a limitation but can easily be overcome by careful design and installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIe-6; woodland group 3o.

MaC—Madison sandy loam, 6 to 10 percent slopes. This moderately deep to deep soil over saprolite is well drained. It is on ridges and side slopes adjacent to the small and medium streams and at heads of drainageways. Slopes are smooth and convex. Individual areas are 10 to about 100 acres.

Typically, the surface layer is reddish brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay, and the lower part is red clay loam to a depth of about 34 inches. Below this to a depth of 5 feet or more is weathered quartz-mica-schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil, Hiwassee, and Madison soils. These included soils make up 10 to 20 percent of the map unit, but separate areas are generally less than 3 acres. Also included are a few small areas where slopes are less than 6 percent or greater than 10 percent and a few small areas where the surface layer is clay loam or sandy clay loam. These small areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep or moderately deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains. It has high potential for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be easily overcome by good design and careful installation. The clay subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IIIe-5; woodland group 3o.

MaD—Madison sandy loam, 10 to 15 percent slopes. This moderately deep to deep soil over saprolite is well drained. It is adjacent to medium and large streams and at the heads of drainageways. Slopes are smooth and convex. Individual areas are 4 to about 30 acres.

Typically, the surface layer is reddish brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay, and the lower part is red clay loam to a depth of about 34 inches. Below this to a depth of 5 feet or more is weathered quartz-mica-schist rock.

Included are a few small areas where slopes are less than 10 percent or greater than 15 percent. Also included are a few small areas where the surface layer is clay loam or sandy clay loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is low to medium. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep or moderately deep and is easily penetrated by plant roots.

This soil has low potential for row crops and small grains. It has medium potential for hay and pasture. Its potential is limited because of the strong slopes. Good tilth is easily maintained by returning crop residue to the

soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine and yellow-poplar. There are no significant limitations in woodland use and management.

This soil has moderate potential for most urban uses. The low strength and strong slopes are limitations but can be overcome by careful design and installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 3o.

MaE—Madison sandy loam, 15 to 25 percent slopes. This moderately deep to deep soil over saprolite is well drained. It is adjacent to medium and large streams. Slopes are short, smooth, and convex. Individual areas are 15 to about 70 acres.

Typically, the surface layer is reddish brown sandy loam about 6 inches thick. The upper part of the subsoil is red clay, and the lower part is red clay loam to a depth of about 34 inches. Below this to a depth of 5 feet or more is weathered quartz-mica-schist rock.

Included are a few small areas where slopes are less than 15 percent or greater than 25 percent, a few small areas where the surface layer is clay loam or sandy clay loam, and a few areas where small to large gullies have formed. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep or moderately deep and is easily penetrated by plant roots.

This soil is not suited to row crops and small grains. It has a low potential for hay and pasture. Its potential is limited because of the moderately steep slopes. Erosion is a very severe hazard if cultivated crops are grown. Because of the very severe erosion hazard, this soil should be cultivated only in establishing permanent pasture. It should be kept in permanent sod or trees.

This soil has medium potential for loblolly pine and yellow-poplar. The moderately steep slopes are moderate limitations in managing the tree crop.

This soil has low potential for urban uses. Its potential is limited because of the moderately steep slopes.

This soil has medium potential for woodland wildlife habitat. Capability unit VIe-2; woodland group 3r.

MdC2—Madison clay loam, 6 to 10 percent slopes, eroded. This moderately deep to deep soil over saprolite is well drained. It is on narrow ridges, in areas adjacent to small and medium streams, and at heads of drainageways. Slopes are smooth and convex. Individual areas are 10 to about 50 acres.

Typically, the surface layer is red clay loam about 3 inches thick. The upper part of the subsoil is red clay, and the lower part is red clay loam to a depth of about 34 inches. Below this to a depth of 5 feet or more is weathered quartz-mica-schist rock.

Included with this soil in mapping are a few small intermingled areas of Cecil and Hiwassee soils. These included soils make up about 10 to 20 percent of the map unit, but separate areas are generally less than 3 acres. Also included are a few small areas where slopes are less than 6 percent or greater than 10 percent, a few small areas where the surface layer is sandy loam or sandy clay loam, and small areas where shallow to deep gullies have formed. These areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is low to medium. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is deep or moderately deep and is easily penetrated by plant roots.

This soil has medium potential for row crops and small grains, but it has a high potential for hay and pasture. Its potential is limited because of the eroded surface layer. The tilth can be improved by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Minimum tillage, terraces, contour farming, stripcropping, grassed waterways, and cover crops, including grasses and legumes, help to reduce runoff and control erosion.

The soil has medium potential for loblolly pine. The eroded surface layer is a moderate limitation in managing the tree crop.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be easily overcome by good design and careful installation. The clay subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit IVe-5; woodland group 4c.

PaE—Pacolet sandy loam, 15 to 25 percent slopes. This moderately deep soil over saprolite is well drained. It is on the short slopes adjacent to medium and large streams. Individual areas are 10 to about 100 acres.

Typically, the surface layer is yellowish brown sandy loam about 6 inches thick. The subsoil is about 25 inches thick. The upper part is red clay, and the lower part is red clay loam. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included are a few small areas where slopes are less than 15 percent or greater than 25 percent and a few small areas where the surface layer is sandy clay loam or clay loam. In a few places there are deep gullies. These included areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in surface layers that have been limed.

Permeability is moderate, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep and is easily penetrated by plant roots.

This soil is not suited to row crops and small grains. It has a low potential for hay and pasture. Its potential is limited because of the moderately steep slopes. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown. Because of the very severe erosion hazard, this soil should be cultivated only in establishing permanent pasture. It should be kept in permanent sod or trees.

This soil has medium potential for loblolly pine, shortleaf pine, and yellow-poplar. The moderately steep slopes are moderate limitations in managing the tree crop.

This soil has very low potential for urban uses. Its potential is limited because of the moderately steep slopes.

This soil has medium potential for woodland wildlife habitat. Capability unit VIe-2; woodland group 3r.

PaF—Pacolet sandy loam. 25 to 40 percent slopes. This moderately deep soil over saprolite is well drained. It is on the short slopes adjacent to medium and large streams. Individual areas are 10 to about 70 acres.

Typically, the surface layer is yellowish brown sandy loam about 6 inches thick. The subsoil is about 25 inches thick. The upper part is red clay, and the lower part is red clay loam. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included are small areas where slopes are less than 25 percent, a few small areas where the surface layer is sandy clay loam or clay loam, and a few areas where deep gullies have formed. These included areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep and is easily penetrated by plant roots.

This soil is not suited to row crops, small grains, hay, or pasture. Erosion is a very severe hazard if cultivated crops are grown. Because of the very severe erosion hazard, this soil should not be cultivated. The entire acreage should be wooded.

This soil has medium potential for loblolly pine, shortleaf pine, and yellow-poplar. The steep slopes are moderate limitations in managing the tree crop.

This soil has very low potential for urban uses. Its potential is limited because of the steep slopes.

This soil has medium potential for woodland wildlife habitat. Capability unit VIIe-2; woodland group 3r.

PcD2—Pacolet clay loam, 10 to 15 percent slopes, eroded. This moderately deep soil over saprolite is well drained. It is adjacent to small and medium streams. Individual areas are 4 to about 30 acres.

Typically, the surface layer is red clay loam about 2 inches thick. The subsoil is about 25 inches thick. The upper part is red clay, and the lower part is red clay loam. Below this to a depth of 5 feet or more is weathered granite, gneiss, or schist rock.

Included are a few small areas where slopes are less than 10 percent or greater than 15 percent, a few small areas where the surface layer is sandy loam or sandy clay loam, and a few areas where deep gullies have formed (fig. 6). These included areas are 1/8 acre to 3 acres.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in a surface layer that has been limed. Permeability is moderate, and the available water capacity is low to medium. The soil has poor tilth and can be worked within only a narrow range of moisture content. The root zone is moderately deep and is easily penetrated by plant roots.

This soil has low potential for row crops and small grains, but it has a medium potential for hay and pasture. Its potential is limited because of the eroded surface layer and the strong slopes. The tilth can be improved by returning crop residue to the soil. Erosion is a very severe hazard if cultivated crops are grown.

The soil has medium potential for loblolly pine and shortleaf pine. The eroded surface layers are moderate limitations in managing the tree crop.

This soil has medium potential for most urban uses. The low strength and slope are limitations but can be overcome by good design and careful installation. The clayey subsoil has moderate permeability, which is a moderate limitation for septic tank absorption fields but can be overcome by increasing the size of the absorption area or modifying the filter field. Capability unit VIe-2; woodland group 4c.

Tc—Toccoa-Cartecay complex. This complex consists of areas of nearly level Toccoa and Cartecay soils that are so intermingled that they could not be separated at the scale selected for mapping. It occurs as areas of 10 to about 80 acres, about 100 feet to 600 feet wide, on first bottoms along the small and medium streams. Individual areas of each soil are 1/8 acre to about 10 acres.

Toccoa sandy loam makes up about 45 to 65 percent of each mapped area. Typically, the surface layer is dark brown sandy loam about 9 inches thick. The upper part of the underlying material is brown sandy loam. The lower part of the underlying material, to a depth of 73 inches, is strong brown sand and dark brown sandy loam.

This soil is low in natural fertility and medium in organic matter content. It is slightly acid through strongly acid throughout, except in a surface layer that has been limed. Permeability is moderately rapid, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

Cartecay fine sandy loam makes up about 20 to 30 percent of each mapped area. Typically, the surface layer is

reddish brown fine sandy loam about 10 inches thick. The upper part of the underlying material is yellowish red or reddish brown sandy loam with gray mottles. The lower part of the underlying material, to a depth of about 47 inches, is thin strata of gray sand, loamy sand, and silt loam.

This soil is low in natural fertility and organic matter content. It is slightly acid or strongly acid throughout, except in a surface layer that has been limed. Permeability is moderately rapid, and the available water capacity is low to medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This complex has a high potential for row crops, small grains, hay, pasture, and vegetables. Its potential is limited because of wetness and flooding. Good tilth can be easily maintained by returning crop residue to the soil.

This complex has a very low potential for urban uses. Wetness and flooding (fig. 7) are severe limitations that are very difficult to overcome.

This complex has a very high potential for loblolly pine, sweetgum, yellow-poplar, cottonwood, green ash, and southern red oak. The use of equipment is restricted for short periods during wet seasons.

This complex has a high potential for woodland wildlife habitat and a moderate potential for recreational use. Capability unit IIIw-13; woodland groups 1o and 2w.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

CHARLES A. HOLDEN, JR., conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 208,000 acres in Anderson County was used for pasture and field crops in 1970 according to the Conservation Needs Inventory. Of this total, about 71,500 acres was in permanent pasture and about 137,000 acres in field crops, mainly soybeans, corn, cotton, wheat, and oats.

The potential of the soils in Anderson County for increased production of food is good. The production of food can be increased considerably by applying the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

The acreage in crops and pasture is gradually decreasing as more and more land is used for urban development. It was estimated that in 1970 about 22,000 acres (*11*) was

urban and built-up land. This acreage has been increasing at the rate of about 500 acres per year. Land use decisions that will influence the future role of farming in the county are considered in the section "General soil map for broad land use planning."

Soil erosion is the major problem on about 95 percent of the acreage in Anderson County. If the slope is more than 2 percent, water erosion is a hazard. Most soils in Anderson County that are used for crops have slopes of more than 2 percent and are subject to damage by water erosion.

Loss of the surface layer through erosion is damaging for two reasons: (1) productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils with a clayey subsoil, such as the Cecil, Hiwassee, and Madison soils, and on soils with a layer in or below the subsoil that limits the depth of the root zone. The fragipan in the Cataula soil is an example. Erosion also reduces productivity on soils that tend to be droughty. (2) Soil erosion on farmland results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of the water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, preparing a good seedbed and tilling are difficult on clayey or hardpan spots because the original friable surface layer has been eroded away. Such spots are common in areas of eroded Cecil and Hiwassee soils.

The risk of water erosion can be controlled by diversions, terraces, contour tillage, and grassed waterways. Cropping systems that include sod crops in the rotation, and tillage that leaves protective residue on the surface also help. Erosion control provides protective surface cover, reduces runoff, and increases infiltration. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system not only reduce the erosion hazard on sloping land but also provide nitrogen and improve tilth for the following crop.

These practices can be adapted to most soils in Anderson County but are less successful on the eroded soils. No tillage for soybeans, which is common on an increasing acreage, is effective in reducing erosion on the sloping land and can be adapted to most soils in Anderson County.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Appling, Cataula, Cecil, Durham, Hiwassee, and Madison soils are suitable for terraces. The other soils are less suitable for terracing and diversions because of steep slopes.

Contouring and contour stripcropping, erosion control practices, are best adapted to soils with smooth, uniform slopes, including most areas of the sloping Appling, Cecil, Cataula, Hiwassee, and Madison soils.

Information on the design of erosion control practices for each kind of soil is in the Technical Guide, available in the local office of the Soil Conservation Service.

Soil drainage is not a major management problem in Anderson County. Less than 5 percent of the total acreage needs some type of artificial drainage. These are the Cartecay and Chewacla soils, which are mapped in the Cartecay-Chewacla complex and the Toccoa-Cartecay complex. Small areas of wetter soils along drainageways and in swales are included in the areas of Cartecay-Chewacla complex and the Toccoa-Cartecay complex. Artificial drainage is needed in some of these wetter areas.

Soil fertility is naturally low in all soils in Anderson County. All require regular applications of lime and fertilizer. Nearly all of the upland soils are naturally strongly or very strongly acid. If they have never been limed, they require applications of ground limestone to raise the pH level sufficiently for good crop growth. Available phosphorus and potash levels are naturally low in most of these soils. On all soils additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils in good tilth are granular and porous.

Most of the soils used for crops in Anderson County have a sandy loam surface layer and are low in content of organic matter. Generally, the structure is weak and granular, which is about ideal for good germination of seeds and infiltration of water. The organic matter content and soil structure can be improved by using the kind of tillage that leaves a mulch of crop residue on the surface of the soil. Also, regular additions of crop residue, manure, and other organic material increase the organic matter content and improve structure.

Fall plowing is generally not a good practice because most of the cropland in the county consists of sloping soils that are subject to damaging erosion if they are plowed in the fall. If erosion can be controlled, fall plowing generally results in good tilth in the spring.

Field crops suited to the soil and climate of the county include many that are not now commonly grown. Soybeans, corn, cotton, and, to an increasing extent, grain sorghum are the row crops. Sunflowers, peanuts, potatoes, squash, cucumbers, okra, and similar crops can be grown if conditions are favorable.

Wheat and oats are the common close-growing crops. Rye and barley grow well. Grass seed from fescue, orchardgrass, and redtop can be produced if conditions are favorable.

Special crops grown in the county are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the county is used for melons, strawberries, sweet corn, tomatoes, and other vegetables. In addition, large areas can be adapted to other special crops, such as grapes, peaches, pears, and many vegetables.

Deep soils that have good natural drainage and that warm up early in the spring are especially well suited to many vegetables. Examples in this county are Appling,

Cataula, Cecil, Durham, Hiwassee, and Madison soils. Crops generally can be planted and harvested early on all of these soils.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in tables 5 and 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in tables 5 and 6.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in tables 5 and 6 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 7. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops

and pasture may be in low-intensity use, for example, soils in capability classes II and III. Data in this table can be used to determine the farming potential of such soils.

The capability unit is identified in the description of each soil mapping unit in the section "Soil maps for detailed planning." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

Woodland management and productivity

NORMAN W. RUNGE, forester, Soil Conservation Service, helped prepare this section.

Originally, Anderson County was mainly wooded. Now woodland covers about 45 percent of the county.

Good stands of commercial trees are produced in the woodlands of the county. Needleleaf forest types are dominant on the hills, and broadleaf types on bottoms along the rivers and creeks.

The value of wood products is substantial but is below its potential. Other values include grazing, wildlife, recreation, natural beauty, and conservation of soil and water. This section has been provided to explain how soils affect tree growth and management in the county. In table 8 potential productivity and management problems of the soils in Anderson County are listed.

Table 8 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland group) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 8 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Woodland yields

Data on growth and yields of unmanaged stands are not a true measure of potential productivity of managed stands, but such information permits a comparison of productivity between sites or between species on the same site. Also, by comparing potential yields of wood crops and potential yields of other crops on a site, one can decide the use of land that best meets the objectives.

Average annual growth for managed stands by site indexes at 50 years is shown in figures 8 and 9 (*6*, *7*).

Merchantable volumes for loblolly pine plantations (*4*) by site indexes at 25 years are shown in figure 10.

Engineering

RICHARD G. CHRISTOPHER III, area engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 9 shows, for each kind of soil, the degree and kind of limitations for building site development; table 10, for sanitary facilities; and table 12, for water management. Table 11 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 9. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, and open ditches. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 9 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 9 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 10 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in ex-

cavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 10 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 11 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 15 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 11 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 15.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 12 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

Among the many recreational facilities throughout the county are parks, athletic fields, playgrounds, tennis courts, swimming pools, gun clubs, and golf courses. The city of Anderson has a recreation center. Hartwell Lake, about 24,000 acres of water in Anderson County, offers an abundance of fishing, swimming, and water-skiing.

Many public facilities, such as boat ramps, picnic areas, and camping areas, are operated by the U.S. Corps of Engineers on Hartwell Lake. Swimming, picnicking, water-skiing, and fishing are also enjoyed on Broadway Lake and Secession Lake. Trout fishing in the Savannah River below the Hartwell Lake Dam is a popular sport. Hunting is enjoyed by many throughout the county.

The soils of the survey area are rated in table 13 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 13 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given

in table 10, and interpretations for dwellings without basements and for local roads and streets, given in table 9.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

WILLIAM W. NEELY, biologist, Soil Conservation Service, helped prepare this section.

Anderson County has a wide variety of wildlife habitat and therefore a variety of wildlife species. In proper season, every bird species common to the Piedmont of South Carolina can be found in one part of the county or another. Farm ponds, Lake Hartwell, and streams produce favorable conditions for wetland habitat. Bottom land hardwoods provide excellent habitat for woodland wildlife.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 14, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bicolor lespedeza, clover, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Exam-

ples of wild herbaceous plants are beggarweed, panicums, pokeweed, partridgepea, ragweed, and wild beans.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, persimmon, sassafras, sumac, black walnut, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, and cattail.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, killdeer, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, vireos, woodpeckers, squirrels, gray fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 15 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 15 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 15 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 18. The estimated classification, without group index numbers, is given in table 15.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 16 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective

measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors K and T are given for the soils in Anderson County. They are used in an equation that predicts the amount of soil loss resulting from rainfall erosion of croplands. The soil loss prediction procedure is outlined by the U.S. Department of Agriculture, Agricultural Research Service (*10*) and is useful to guide the selections and practices for Soil and Water Conservation. The soil erodibility factor "K" is a measure of the rate at which a soil will erode when other factors affecting erosion are constant. Soil-loss tolerance "T", sometimes called permissible soil loss, is the maximum rate of soil erosion that will permit a high level of crop productivity to be sustained economically over a long period of time.

Soil and water features

Table 17 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Engineering test data

To help evaluate the soils for engineering purposes, 33 soil samples from some representative profiles were tested according to standard procedures. The tests were performed by the South Carolina Highway Department

according to standard procedures of the American Association of State Highway and Transportation Officials (*1*). The test data are given in table 18. Grain size distribution, liquid limit, and plasticity index were determined. The soils were subsequently classified according to the Unified Soil Classification System (*2*) and the AASHTO system.

The tests show some variations in the characteristics of the soils but probably do not show the entire range of variations in the lower horizons. Since each soil profile was sampled to a depth of about 6 feet, the data are not adequate for estimating the characteristics of soil material in deeper cuts.

Mechanical analysis to determine the relative proportion of particles of different sizes was made by a combination of the sieve and hydrometer methods.

Liquid limit and plastic limit tests measure the effect of moisture on the consistence of soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic state to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state (*5*). The liquid limit is the moisture content at which the material passes from a plastic state to a liquid state. The plasticity index is defined as the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*9*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Appling series

The Appling series consists of deep, well drained, moderately permeable soils that formed in material weathered from granite, gneiss, and schist. These soils are on medium and broad ridges. Slopes range from 2 to 10 percent.

Appling soils are geographically closely associated with Cecil, Durham, and Madison soils. Cecil soils are on adjacent slopes and have a redder B2t horizon. Durham soils are on adjacent slopes and have a fine loamy control section. Madison soils are on slightly higher convex ridges and have a micaceous B2t horizon.

Typical pedon of Appling sandy loam is from an area of Appling sandy loam, 2 to 6 percent slopes, about 3 1/4 miles west of the Anderson Airport, about 1,670 feet east of the intersection of S.C. Highway 187 and S.C. Secondary Highway 261, about 650 feet south of S.C. Secondary Highway 261, and about 30 feet west of field road.

Ap—0 to 8 inches; brown (10YR 5/3) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; few small and medium angular quartz fragments, 5 to 15 mm long; slightly acid, pH 6.3; clear smooth boundary.

A2—8 to 11 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; few medium and coarse angular quartz gravel; neutral, pH 6.6; abrupt smooth boundary.

B21t—11 to 26 inches; strong brown (7.5YR 5/6) clay; moderate medium and coarse subangular blocky structure; firm, sticky and slightly plastic; thin discontinuous clay films on faces of peds; many fine roots; strongly acid, pH 5.4; clear smooth boundary.

B22t—26 to 42 inches; yellowish red (5YR 5/6) clay; common fine distinct red (2.5YR 4/6) and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm, sticky and slightly plastic; continuous clay films on faces of peds; few fine roots; very strongly acid, pH 4.8; gradual smooth boundary.

B3—42 to 52 inches; mottled yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and red (2.5YR 4/6) clay loam; moderate medium and coarse subangular blocky structure; firm, sticky and slightly plastic; thin discontinuous clay films; very few fine roots; very strongly acid, pH 4.8; gradual smooth boundary.

C—52 to 76 inches; red (10R 4/6) sandy clay loam saprolite with rock structure; common medium prominent yellowish brown (10YR 5/6) mottles; common flakes of mica and fragments of feldspar; very strongly acid, pH 4.8.

Solum thickness ranges from 41 to 60 inches. The soil is strongly acid or very strongly acid in all horizons unless limed. Depth to hard rock is more than 5 feet.

The Ap horizon is 5 to 12 inches thick and is brown, yellowish brown, or pale brown.

The A2 horizon, where present, is yellowish brown or light yellowish brown and 3 to 7 inches thick.

The B1 horizon, where present, is 4 to 9 inches thick and is yellowish brown, reddish yellow, or strong brown sandy clay loam.

The B2t horizon is 16 to 34 inches of strong brown, reddish yellow, yellowish red, or yellowish brown clay, clay loam, or sandy clay. The lower part has common to many mottles of strong brown, reddish yellow, yellowish red, and red. Average clay content of the upper 20 inches of the B horizon ranges from 35 to 55 percent.

The B3 horizon is 4 to 21 inches of mottled brownish yellow, yellowish brown, strong brown, reddish yellow, red, or yellowish red clay, sandy clay, sandy clay loam, or clay loam.

The C horizon is mottled brownish yellow, red, yellowish brown, or yellowish red sandy clay loam or sandy loam saprolite.

Cartecay series

The Cartecay series consists of somewhat poorly drained, moderately rapidly permeable soils that formed in dominantly loamy alluvial sediments along the flood plains of the streams. These soils are subject to frequent flooding for short periods. They are on nearly level, long,

and narrow first bottoms. Slopes are dominantly less than 1 percent but range up to 3 percent along local drainageways.

Cartecay soils are geographically closely associated with the Chewacla and Toccoa soils. Chewacla soils are on adjacent flood plains and have a fine loamy control section. Toccoa soils are on slightly higher adjacent flood plains and have a coarse loamy control section.

Typical pedon of Cartecay fine sandy loam is from an area of Cartecay-Chewacla complex, about 14 miles north of Anderson, about 2,000 feet south of S.C. Highway 88, 660 feet west of S.C. Secondary Highway 567, and about 50 feet northeast of Six and Twenty Creek.

Ap—0 to 10 inches; reddish brown (5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; many fine flakes of mica; medium acid, pH 5.8; abrupt smooth boundary.

C1—10 to 19 inches; yellowish red (5YR 4/6) sandy loam; massive; very friable; few fine and medium roots; many fine flakes of mica; bedding planes and thin strata of silt loam; medium acid, pH 5.7; clear smooth boundary.

C2—19 to 23 inches; reddish brown (5YR 5/4) sandy loam; common medium distinct light brownish gray (10YR 6/2) and brown (7.5YR 5/4) mottles; massive; very friable; few fine and medium roots; many fine and medium flakes of mica; bedding planes and thin strata of loam and silt loam; medium acid, pH 5.7; gradual wavy boundary.

C3g—23 to 38 inches; mottled gray (10YR 5/1) and very dark gray (10YR 3/1) sandy loam with light olive brown (2.5Y 5/4) along root channels; massive; very friable; few fine and medium roots; few fine and medium flakes of mica; bedding planes and thin strata of loam and silt loam; medium acid, pH 5.8; gradual wavy boundary.

C4g—38 to 47 inches; gray (10YR 5/1) stratified layers of sand and loamy sand with lenses of silt and silt loam; massive; very friable; many fine and medium flakes of mica; many small and medium quartz grains; few medium pebbles; medium acid, pH 5.8.

Depth to bedrock is more than 5 feet. Reaction is strongly to slightly acid throughout the profile.

The surface horizon is reddish brown, brown, or dark grayish brown and is 6 to 10 inches thick.

The C horizon is a sequence of thin strata. The upper part is yellowish brown, light yellowish brown, reddish brown, or brown sandy loam, silt loam, or loam. The lower part is gray, or is mottled with gray, brown, or red, sandy loam, sand, or loamy sand. Below 40 inches the different textures are in thin strata. Mottles with chromas of 2 or less are within 20 inches of the surface. In the 10 to 40 inch control section, clay content is 8 to 18 percent.

Cataula series

The Cataula series consists of well drained, slowly permeable soils that formed in clayey material weathered from granite, gneiss, or schist. These soils are deep over bedrock, but the root zone is moderately shallow over a brittle layer. These soils are on narrow and broad ridges and adjacent to drainageways. Slopes range from 2 to 10 percent.

Cataula soils are geographically closely associated with the Appling and Cecil soils. Appling and Cecil soils are on adjacent slopes and do not have a fragipan.

Typical pedon of Cataula sandy loam is from an area of Cataula sandy loam, 2 to 6 percent slopes, about 4 miles south of Belton, about 500 feet north of intersection of S.C. Secondary Highway 107 and S.C. Secondary Highway 318, and about 10 feet east of S.C. Secondary Highway 107.

Ap—0 to 5 inches; dark brown (10YR 4/3) sandy loam; moderate medium granular structure; very friable; many medium and few coarse roots; strongly acid, pH 5.5; abrupt smooth boundary.

B21t—5 to 10 inches; red (2.5YR 4/6) clay; few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure with a tendency toward weak medium platy; firm, slightly sticky and slightly plastic; thin patchy clay films; many fine roots; very strongly acid, pH 5.0; clear smooth boundary.

B22t—10 to 20 inches; red (2.5YR 4/6) clay; common medium distinct reddish yellow (7.5YR 6/6) and strong brown (7.5YR 5/6) mottles; moderate medium platy structure which separates to moderate medium and fine subangular blocky; continuous clay films; extremely firm, sticky and slightly plastic; many fine roots; strongly acid, pH 5.3; clear smooth boundary.

Bx—20 to 35 inches; red (2.5YR 4/6) clay loam in 1/2 to 1 1/2 inch layers separated by 1/4 inch layers of brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8) clay; red layers are interrupted at 2 to 6 inch intervals by the brownish yellow and strong brown material; very coarse platy structure which parts to medium and coarse angular and subangular blocky; red part is brittle; other parts firm; clay films along horizontal faces of peds; common fine roots along horizontal faces of peds; common fine and medium pores; strongly acid, pH 5.3; gradual smooth boundary.

B3—35 to 56 inches; red (2.5YR 4/6) clay loam; common medium distinct yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and reddish yellow (5YR 6/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; thin patchy clay films; strongly acid, pH 5.1; diffuse wavy boundary.

C—56 to 67 inches; reddish yellow (7.5YR 8/6) saprolite of weathered gneiss; sandy loam and sandy clay loam texture; red (2.5YR 4/6) sandy clay loam and clay loam B3 material on faces of cracks and in pockets; few pink (7.5YR 8/4) mottles which appear to be weathered feldspar; common flakes of mica; very strongly acid, pH 5.0.

Solum thickness ranges from 47 to 60 inches or more. The soil is strongly acid or very strongly acid throughout unless limed. Depth to hard rock is more than 5 feet. Depth to the fragipan ranges from 16 to 24 inches.

The surface horizon is 2 to 8 inches of dark brown, brown, or dark yellowish brown sandy loam, or yellowish red or red clay loam.

The B1 horizon, where present, is yellowish red or strong brown sandy loam, or sandy clay loam 2 to 5 inches thick.

The B2t horizon is red or yellowish red with or without yellowish and brownish mottles and 8 to 22 inches thick. The upper 20 inches of the B horizon is from 35 to 55 percent clay.

The Bx horizon is 12 to 30 inches thick and is horizontally streaked with brown, yellow, and red. In places it is gray in the lower part. It is sandy clay loam, clay loam, or sandy clay and may have thin layers of clay.

The B3 horizon is red or yellowish red clay loam, sandy clay loam, or clay with common to many mottles of brown, yellow, gray, and red. Thickness ranges from about 12 to 36 inches.

The C horizon is saprolite weathered from granite, gneiss, or schist. It has rock controlled structure.

Cecil series

The Cecil series consists of deep, well drained, moderately permeable soils that formed in clayey material weathered from granite, gneiss, or schist. These soils are on narrow and broad ridges and adjacent to drainageways. Slopes range from 2 to 15 percent.

Cecil soils are geographically closely associated with Appling, Cataula, Hiwassee, and Madison soils. Appling

soils are on adjacent slopes and have a browner B2t horizon. Cataula soils are on adjacent slopes and have a fragipan. Hiwassee soils are on adjacent slopes and have a darker red B2t horizon. Madison soils have a micaceous B2t horizon.

Typical pedon of Cecil sandy loam is from an area of Cecil sandy loam, 2 to 6 percent slopes, about 3 1/2 miles north of Anderson, about 1/2 mile west of intersection of S.C. Highway 81 and Edgebrook Drive, and about 190 feet south of Edgebrook Drive.

Ap—0 to 6 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; many fine and medium roots; few small angular fragments of quartz; medium acid, pH 6.0; abrupt smooth boundary.

B21t—6 to 27 inches; red (2.5YR 4/6) clay; moderate medium and coarse subangular blocky structure; firm, sticky and slightly plastic; thick clay films on faces of peds; few fine and medium roots; few small angular fragments of quartz; strongly acid, pH 5.4; gradual smooth boundary.

B22t—27 to 41 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; thin clay films on faces of most peds; few small angular fragments of quartz; few fine flakes of mica; very strongly acid, pH 5.0; gradual smooth boundary.

B3—41 to 53 inches; red (2.5YR 4/8) clay loam; few fine distinct reddish yellow mottles; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; thin clay films on faces of some peds; few small angular fragments of quartz; common fine flakes of mica; very strongly acid, pH 5.0; gradual smooth boundary.

C—53 to 70 inches; red (2.5YR 5/8) schist saprolite that crushes to loam; few fine distinct reddish yellow mottles; rock structure; friable, slightly sticky, nonplastic; few small angular quartz fragments; few fragments of feldspar; many fine flakes of mica; very strongly acid, pH 5.0.

Solum thickness ranges from 41 to 58 inches. Depth to hard rock is more than 5 feet. Throughout the profile the soil is strongly acid or very strongly acid except where the surface layer is limed.

The surface horizon is 2 to 8 inches thick and is sandy loam or clay loam. Colors are brown, dark grayish brown, grayish brown, reddish brown, yellowish red, or red.

The B1 horizon, where present, is yellowish red, reddish brown, or red sandy clay loam or clay loam 2 to 7 inches thick.

The B2t horizon is 24 to 44 inches thick. Some pedons have thin subhorizons of clay loam or sandy clay loam, and some are mottled with brown. The upper 20 inches of the Bt horizon is 35 to 60 percent clay.

The B3 horizon is clay loam or sandy clay loam. Thickness is 6 to 22 inches.

The C horizon is red saprolite weathered from granite, schist, or gneiss. It has rock controlled structure.

Chewacla series

The Chewacla series consists of deep, somewhat poorly drained, moderately permeable soils that formed in alluvial sediments along the flood plains of the streams. These nearly level soils are subject to frequent flooding for short periods. They are on long and narrow first bottoms. Slopes are dominantly less than 1 percent but range up to 3 percent.

Chewacla soils are geographically closely associated with the Cartecay and Toccoa soils. Cartecay soils are on adjacent flood plains and have a coarse loamy control section. Toccoa soils are on slightly higher areas and have a coarse loamy control section.

Typical pedon of Chewacla loam is from an area of Cartecay-Chewacla complex, about 6 1/4 miles west of Honea Path, on flood plains of Hen Coop Creek, about 125 feet north of S.C. Highway 252, and 160 feet west of Hen Coop Creek.

Ap—0 to 5 inches; brown (10YR 4/3) loam; few fine distinct strong brown and grayish brown mottles (the grayish brown mottles are around root channels); weak fine granular structure; very friable; many fine roots; common fine and medium pores; few fine flakes of mica; medium acid, pH 5.6; clear smooth boundary.

B1—5 to 10 inches; brown (7.5YR 5/4) clay loam; few fine faint strong brown and grayish brown mottles (the grayish brown mottles are around root channels); weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; few fine pores; few fine flakes of mica; strongly acid, pH 5.4; clear wavy boundary.

B21—10 to 20 inches; dark brown (7.5YR 4/4) sandy clay loam; few medium distinct pale brown (10YR 6/3) and very dark brown (10YR 2/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; few fine black concretions; common fine flakes of mica; medium acid, pH 5.7; gradual wavy boundary.

B22—20 to 29 inches; dark brown (7.5YR 4/4) clay loam; common medium distinct gray (10YR 5/1) and common fine distinct strong brown mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; few fine flakes of mica; strongly acid, pH 5.4; gradual wavy boundary.

B23g—29 to 40 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; strongly acid, pH 5.3; gradual wavy boundary.

B3g—40 to 45 inches; gray (2.5Y 5/1) sandy clay loam; few medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; strongly acid, pH 5.1; gradual wavy boundary.

Cg—45 to 70 inches; gray (2.5Y 6/1) loamy sand; few coarse distinct dark gray (10YR 4/1) mottles; loose; single grained; few fine flakes of mica; strongly acid, pH 5.1.

Solum thickness ranges from 45 to 70 inches. Depth to hard rock is more than 6 feet. Reaction is strongly to slightly acid in all horizons unless limed. A few fine flakes of mica are throughout the profile.

The Ap horizon is brown and dark brown loam or silt loam 4 to 10 inches thick.

The B1 horizon is brown, yellowish brown, or dark yellowish brown loam, silt loam, silty clay loam, or clay loam 5 to 13 inches thick. Some B1 horizons have light brownish gray or brownish yellow mottles.

The B2 horizon is brown, dark brown, brownish yellow, light yellowish brown, yellowish brown, dark yellowish brown, reddish brown, pale brown, light brownish gray, or grayish brown. It has mottles of gray, yellowish brown, strong brown, reddish brown, or brown. It is sandy clay loam, silty clay loam, silt loam, or loam 25 to 41 inches thick.

The B3g horizon is gray, grayish brown, or light brownish gray and has mottles of yellowish red, yellowish brown, and strong brown. It is silty clay loam, sandy clay loam, or silt loam 5 to 34 inches thick.

The C horizon is gray loam, sandy loam, loamy sand, or sand.

Durham series

The Durham series consists of deep, well drained, moderately permeable soils that formed in loamy material weathered from granite, gneiss, or schist. These gently sloping soils are on ridges. Slopes range from 2 to 6 percent.

Durham soils are geographically closely associated with the Appling and Cecil soils. Appling and Cecil soils have more clay in the B2t horizon, and Cecil soils are redder.

Typical pedon of Durham sandy loam is from an area of Durham sandy loam, 2 to 6 percent slopes, about 14 miles west of Anderson, about 1 1/4 mile northwest of Fork Elementary School, about 1 mile south of Townville, and 500 feet west of unnumbered paved county highway.

Ap—0 to 6 inches; brown (10YR 5/3) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; medium acid, pH 5.9; clear smooth boundary.

A2—6 to 13 inches; pale brown (10YR 6/3) sandy loam; weak medium and coarse granular structure; very friable; many fine and medium roots; medium acid, pH 5.8; clear smooth boundary.

B21t—13 to 20 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; few fine and medium roots; very strongly acid, pH 4.9; clear smooth boundary.

B22t—20 to 31 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine and medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; few fine and medium roots; very strongly acid, pH 5.0; gradual smooth boundary.

B3—31 to 42 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; many small quartz grains; very few fine roots; very strongly acid, pH 4.5; gradual smooth boundary.

C—42 to 50 inches; mottled yellow, yellowish red, and pale brown sandy loam saprolite having rock structure; friable; very strongly acid, pH 4.5.

Solum thickness ranges from 40 to 54 inches. Depth to hard rock is more than 5 feet. The soil is strongly acid or very strongly acid in all horizons, except where surface horizons have been limed.

Total thickness of the A horizon is 7 to 14 inches.

The Ap horizon is 6 to 8 inches thick and is brown or grayish brown.

The A1 horizon, in wooded areas, is 2 to 3 inches thick and is grayish brown or dark gray.

The A2 horizon is 3 to 10 inches thick and is pale brown, light brownish gray, or light yellowish brown.

The B1 horizon, when present, is 3 to 6 inches thick and is yellowish brown, brownish yellow, olive yellow, or yellow sandy loam or sandy clay loam.

The B2t horizon is 18 to 28 inches thick. Textures include clay loam or sandy clay loam. Some pedons have subhorizon of sandy clay less than 9 inches thick. Colors of the B2t horizon are yellowish brown, brownish yellow, olive yellow, or strong brown. The lower part of the B2t horizon has yellowish red, strong brown, yellowish brown, or brownish yellow mottles. Clay content in the control section is 18 to 35 percent.

The B3 horizon is 7 to 20 inches thick and is strong brown, yellowish brown, pale brown, yellowish red, red, reddish yellow, or brownish yellow, with varying shades of red, brown, and yellow mottles. Some pedons have gray mottles.

The C horizon is mottled yellow, yellowish brown, brownish yellow, red, yellowish red, pale brown, light gray, gray, or strong brown weathered saprolite.

Gwinnett series

The Gwinnett series consists of moderately deep, well drained, moderately permeable soils that formed from weathered hornblende gneiss and diorite. These soils are on moderately steep and steep side slopes. Slopes range from 15 to 40 percent.

Gwinnett soils are geographically closely associated with the Hiwassee, Pacolet, and Madison soils. Hiwassee soils have a thicker solum and are on convex ridges. Pacolet soils have a red B2t horizon and are on adjacent side slopes. Madison soils have a red micaceous B2t horizon and are on convex ridges and adjacent side slopes.

Typical pedon of Gwinnett sandy loam is from an area of Gwinnett sandy loam, 15 to 25 percent slopes, about 1 mile east of crossing of S.C. Highway 184 over Savannah River, about 1/4 mile southeast of intersection of S.C. Highway 184 and unnumbered paved highway, and 70 feet west of unnumbered paved highway.

Ap—0 to 3 inches; dark reddish brown (5YR 3/3) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; few small angular fragments of quartz; strongly acid, pH 5.5; abrupt smooth boundary.

B2t—3 to 30 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; thick continuous clay films on faces of peds; few fine and medium roots; few fine flakes of mica; few small feldspar particles; strongly acid, pH 5.5; clear smooth boundary.

B3—30 to 36 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; patchy clay films on faces of peds; few fine roots; few small quartz and feldspar particles; common fine flakes of mica; strongly acid, pH 5.5; diffuse wavy boundary.

C—36 to 45 inches; dark red (10R 3/6) saprolite; rock structure; crushes to sandy clay loam; strongly acid, pH 5.5.

Thickness of the solum ranges from 21 to 36 inches. Depth to hard rock is 5 feet or more. Reaction is slightly acid through strongly acid throughout the profile.

The A horizon is dusky red, dark red, or dark reddish brown sandy loam or clay loam 3 to 5 inches thick.

The B2t horizon is 13 to 30 inches thick.

The B3 horizon is dark red or red clay or clay loam 5 to 20 inches thick. Clay content in the control section is 35 to 60 percent.

The C horizon is partly weathered rock mixed with fractured hard rock. In places there is a relatively thick saprolite layer that crushes to a red or dark red clay loam, sandy clay loam, or loam.

Hiwassee series

The Hiwassee series consists of deep, well drained, moderately permeable soils that formed in material weathered from dark colored rocks. These soils are on narrow and broad ridges and on areas adjacent to drainageways. Slopes range from 2 to 15 percent.

Hiwassee soils are geographically closely associated with the Cecil, Gwinnett, and Madison soils. Cecil soils have a red B2t horizon. Gwinnett soils have a thinner solum and occur on moderately steep and steep side slopes. Madison soils have a red micaceous B2t horizon.

Typical pedon of Hiwassee sandy loam is from an area of Hiwassee sandy loam, 2 to 6 percent slopes, about 4 miles west of Anderson, about 3/4 mile south of S.C. Highway 24, and about 1/4 mile east of Five Mile Creek.

Ap—0 to 5 inches; dark reddish brown (2.5YR 3/4) sandy loam; moderate medium granular structure; very friable; many fine roots; few small angular fragments of quartz; medium acid, pH 5.8; abrupt smooth boundary.

B21t—5 to 17 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; thin patchy clay films; many fine roots; few fine quartz grains; medium acid, pH 6.0; clear smooth boundary.

B22t—17 to 38 inches; dark red (2.5YR 3/6) clay; moderate fine and medium subangular blocky structure; firm, sticky and slightly

plastic; thin patchy clay films; few fine roots; common fine flakes of mica; few fine quartz grains; strongly acid, pH 5.5; gradual wavy boundary.

B3—38 to 62 inches; dark red (2.5YR 3/6) clay; weak medium and fine subangular blocky structure; firm, slighty sticky and slightly plastic; thin patchy clay films on faces of peds; very few fine roots; common fine flakes of mica; few small feldspar particles; medium acid, pH 5.6; diffuse wavy boundary.

C—62 to 70 inches; dark red (2.5YR 3/6) saprolite that crushes to clay loam; many medium flakes of mica; few feldspar particles; few small quartz grains; rock controlled structure; medium acid, pH 5.6.

Solum thickness ranges from 41 to more than 60 inches. Depth to hard rock is more than 5 feet. Reaction is slightly acid through very strongly acid throughout the profile, except for surface layers that have been limed.

The Ap horizon is dark reddish brown or dark red sandy loam or clay loam 3 to 8 inches thick.

The B2t horizon is dark red or dusky red clay or clay loam 25 to 54 inches thick.

The B3 horizon is red or dark red, with strong brown mottles, clay or clay loam 7 to 30 inches thick.

The C horizon is dark red or red saprolite with reddish yellow mottles and rock structure. It weathered from hornblende gneiss and diorites.

Madison series

The Madison series consists of moderately deep to deep, well drained, moderately permeable soils that formed in material weathered from quartz-mica-schist or mica-gneiss rock. These soils are on narrow, medium, and broad ridges and on side slopes. Slopes range from 2 to 25 percent.

Madison soils are geographically closely associated with Appling, Cecil, Gwinnett, Hiwassee, and Pacolet soils. Appling soils are on slightly lower convex ridges and have a browner B2t horizon. Cecil soils do not have a micaceous B2t horizon. Hiwassee soils have a dark red B2t horizon. Pacolet soils do not have a micaceous B2t horizon.

Typical pedon of Madison sandy loam is from an area of Madison sandy loam, 2 to 6 percent slopes, about 8 miles northwest of Anderson, about 2,500 feet northwest of junction of S.C. Secondary Highways 62 and 273, and about 20 feet south of S.C. Secondary Highway 62.

Ap—0 to 6 inches; reddish brown (5YR 5/4) sandy loam; very friable; many fine and few medium roots; few fine flakes of mica; medium acid, pH 6.0; abrupt smooth boundary.

B2t—6 to 28 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; thin patchy distinct clay films on faces of peds; few medium roots; common fine flakes of mica; strongly acid, pH 5.4; gradual wavy boundary.

B3—28 to 34 inches; red (2.5YR 5/6) clay loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; thin patchy faint clay films on faces of some peds; many fine and medium flakes of mica; few feldspar fragments; few small fragments of mica-schist; strongly acid, pH 5.4; gradual wavy boundary.

C—34 to 46 inches; red (2.5YR 5/6) saprolite which crushes to clay loam; rock structure; friable; many fine and medium flakes of mica; few fragments of feldspar; many small fragments of mica-schist; strongly acid, pH 5.4.

Solum thickness ranges from 21 to 48 inches. Depth to hard rock is more than 5 feet. Reaction in the surface layer is neutral to strongly acid. Reaction in the B and C horizons is strongly acid or very strongly acid. Flakes of mica are few to many in the upper part of the solum and from common to many in the lower part.

The Ap horizon is 2 to 7 inches thick and is brown, yellowish red, yellowish brown, dark brown, red, and reddish brown sandy loam or clay loam. The redder colors have clay loam textures.

The A1 horizon is brown or very dark grayish brown sandy loam 1 to 3 inches thick.

The A2 horizon, where present, is yellowish brown or dark yellowish brown sandy loam 3 to 6 inches thick.

The B1 horizon, where present, is red or yellowish red clay loam or sandy clay loam 3 to 6 inches thick.

The B2t horizon is red or yellowish red clay loam or clay 17 to 32 inches thick.

The B3 horizon is red, or yellowish red with dark red, strong brown, and yellowish brown mottles. It is clay loam, sandy clay loam, sandy clay, or clay, 5 to 20 inches thick.

The C horizon is light red, red, reddish yellow, or yellowish red weathered saprolite with yellowish brown, strong brown, and reddish brown mottles. It is clay loam, sandy clay loam, sandy loam, or loam with rock structure. Fragments of quartz-mica-schist are common in most pedons.

Pacolet series

The Pacolet series consists of well drained, moderately permeable soils that are moderately deep over saprolite and formed in material weathered from granite, gneiss, and schist. These soils are strongly sloping, moderately steep, and steep. Slopes range from 10 to 40 percent.

Pacolet soils are geographically closely associated with Gwinnett and Madison soils. Gwinnett soils have a dark red B2t horizon. Madison soils have a micaceous B2t horizon.

Typical pedon of Pacolet sandy loam is from an area of Pacolet sandy loam, 25 to 40 percent slopes, about 7 miles southwest of Iva, about 4,600 feet northeast of Gregg Shoals on Savannah River, and 70 feet south of S.C. Secondary Highway 36.

Ap—0 to 6 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; strongly acid, pH 5.2; abrupt smooth boundary.

B2t—6 to 22 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; thin clay films on faces of peds; many fine and a few medium roots; few fine flakes of mica; very strongly acid, pH 4.8; gradual smooth boundary.

B3—22 to 31 inches; red (2.5YR 5/8) clay loam; moderate medium and coarse subangular blocky structure; firm, slightly sticky and slightly plastic; thin patchy faint clay films on faces of peds; few fine roots; common fine flakes of mica; few fine quartz grains; common small feldspar particles; very strongly acid, pH 4.7; diffuse wavy boundary.

C—31 to 49 inches; yellowish red (5YR 4/6) saprolite which crushes to sandy clay loam rock structure; common fine flakes of mica and quartz grains; few feldspar particles; very strongly acid, pH 4.7.

Thickness of the solum ranges from 20 to 37 inches. Depth to hard rock is more than 5 feet. Reaction is medium acid through very strongly acid throughout the profile.

The A horizon is brown, yellowish brown, reddish brown, yellowish red, strong brown, or very dark grayish brown sandy loam 5 to 8 inches thick and, where eroded, is red clay loam 2 to 4 inches thick.

The B1 horizon is red or yellowish red clay loam or sandy clay loam 2 to 8 inches thick.

The B2t horizon is 8 to 25 inches thick. The B2t horizon may have strong brown mottles.

The B3 horizon is clay loam or sandy clay loam 5 to 21 inches thick. The B3 horizon may have light brown, pinkish white, or strong brown mottles.

The C horizon is red or yellowish red weathered saprolite and it may have brown, yellowish brown, pale brown, light yellowish brown, yellow, white, or pink mottles. It is sandy loam, sandy clay loam, or clay loam with rock structure.

Toccoa series

The Toccoa series consists of well drained, moderately rapidly permeable soils that formed in dominantly loamy alluvial sediments along the flood plains of the streams. These nearly level soils are subject to frequent flooding for short periods. They are on long and narrow first bottoms. Slopes are dominantly less than 1 percent but range up to 3 percent along local drainageways.

Toccoa soils are geographically closely associated with the Cartecay and Chewacla soils. Cartecay soils are on slightly lower adjacent flood plains. Chewacla soils are on slightly lower flood plains and have a fine loamy control section.

Typical pedon of Toccoa sandy loam in an area of Toccoa-Cartecay complex, about 1 1/4 miles south of Savannah River Bridge on S.C. Highway 181, and about 600 feet east of Savannah River.

Ap—0 to 9 inches; dark brown (10YR 3/3) sandy loam; moderate medium granular structure; very friable; many fine and medium roots; few fine flakes of mica; medium acid, pH 5.8; abrupt smooth boundary.

C1—9 to 30 inches; brown (7.5YR 4/4) sandy loam; single grained; very friable; many fine roots; few fine flakes of mica; few bedding planes and thin strata about 1 inch thick, having loamy sand texture; medium acid, pH 5.7; clear smooth boundary.

C2—30 to 50 inches; brown (7.5YR 4/4) sandy loam; single grained; very friable; few fine roots; few medium and fine flakes of mica; medium acid, pH 5.9; clear smooth boundary.

C3—50 to 63 inches; strong brown (7.5YR 5/6) sand; single grained; very friable; common fine and medium flakes of mica; few bedding planes and thin strata of pale brown loamy sand; medium acid, pH 5.9; gradual smooth boundary.

C4—63 to 73 inches; dark brown (7.5YR 4/4) sandy loam; single grained; very friable; common fine and medium flakes of mica; medium acid, pH 5.7.

Reaction is slightly acid or strongly acid throughout the profile. Depth to hard rock is more than 5 feet. Flakes of mica are from few to many in all horizons.

The surface horizon is loamy sand, sandy loam, or fine sandy loam. Colors are dark brown, brown, dark yellowish brown, or reddish brown. The C horizon is similar in color and texture to the A horizon. Thin strata of different textures are in most horizons. The control section ranges from 8 to 18 percent clay content.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*12*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 19, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and

in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation and morphology of the soils

This section discusses the factors of soil formation and morphology of the soils.

Factors of soil formation

Soil is the natural medium for the growth of plants and is the product of soil-forming processes acting on accumulated or deposited geologic materials. The five important factors in soil formation are parent material, climate, living organisms (plants and animals), relief, and time.

Climate and living organisms are the active forces of soil formation. Their effect on the parent material is modified by relief and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. In some places one factor dominates in the formation and fixes most of the properties of the soil formed, but normally the interaction of all five factors determines what kind of soil is formed at any given place.

Although soil formation is complex, some understanding of the soil-forming processes may be gained by considering each of the five factors separately. Each of the five factors, however, is affected by and also affects each of the other factors.

Parent material

Parent material is the unconsolidated mass from which a soil is formed. It has much to do with the mineral and chemical composition of the soils. In Anderson County the parent material was derived from two sources, residuum from the parent rocks and alluvium deposited by streams.

Residual parent material is formed in place through the weathering of the underlying rock. Soils formed in this material occupy about 95 percent of the county. For the most part, the rocks of Anderson County are (1) partly granitized mica gneiss; (2) hornblende gneiss; (3) mica schist; (4) and massive or weakly foliated granite.

The mica gneiss contains deeply weathered minerals of quartz, feldspar, and mica. The chief minerals in hornblende gneiss are quartz, feldspar, and hornblende, but in places this rock contains variable amounts of biotite mica and chlorite. The thick layers of residuum consist of clay mixed with fragments of gneiss and with the minerals quartz and mica. The Cecil and Cataula soils formed from this kind of parent material.

Granite is massive or weakly foliated. It is as an intrusion into the gneiss and schist rocks. In general, granite consists of quartz, orthoclase and plagioclase feldspar, biotite and muscovite mica, and of vermiculite and other accessory minerals in variable amounts. In Anderson County the soils formed from weathered granite are the Appling and Durham.

In Anderson County recent alluvium consists of a mixture of gravel, sand, silt, and clay. Much of this alluvium weathered from rocks in the uplands nearby, but some weathered from granite and metamorphosed rocks of the Piedmont Plateau and of the mountains farther north. The soils that formed in recent alluvium are on the bottom lands. The soils on bottoms are weakly developed and still receive deposits during floods. In this county the Chewacla, Cartecay, and Toccoa soils formed in recent alluvium.

Climate

The climate of Anderson County is important in the formation of soils. The county has a temperate climate, and rainfall is well distributed throughout the year.

Climate, particularly precipitation and temperature, affects the physical, chemical, and biological relationships in the soil. Water dissolves minerals, aids chemical and biological activity, and transports the dissolved mineral and organic material through the soil profile. Large amounts of rainwater promote leaching of the soluble bases and the translocation of the less soluble and colloidal material downward through the soil profile. A long frost-free season and high rainfall result in the downward movement of fine-textured soil material and the loss of plant nutrients.

The amount of water that percolates through the soil depends on the amount of rainfall, the relative humidity, and the length of the frost-free season. Percolation, or the downward movement of water, also is affected by relief, or lay of the land, and by permeability of soil material. Weathering of the parent material is intensified if the percolation is interrupted only by brief periods of freezing that is shallow. A high average temperature therefore speeds weathering. A high average temperature also increases the number and kinds of living organisms in the soil, and the organisms, in turn, affect soil formation.

Living organisms

The number and kinds of plants and animal that live in and on the soil are determined mainly by the climate but, to a lesser extent, by parent material, relief, and age of the soil.

Bacteria, fungi, and other micro-organisms are indispensable in soil formation. They hasten the weathering of minerals and the decomposing of organic matter. Larger plants alter the soil microclimate, furnish organic matter, and transfer chemical elements from the subsoil to the surface soil.

Most of the fungi, bacteria, and other micro-organisms in the soils of Anderson County are in the upper few inches of the soil. Earthworms and other small invertebrates are active chiefly in the A horizon and upper part of the B horizon, where they slowly but continuously mix the soil material. Bacteria and fungi decompose organic matter and release nutrients for plant use. Other animals play a secondary role in soil formation, but their

influence is great. By eating plants they perform one step in returning plant material to the soil.

In Anderson County the native vegetation in the uplands was chiefly loblolly pine, shortleaf pine, oak, and hickory. In the bottom land it was mainly sweetgum, black gum, yellow-poplar, maple, tupelo, and ash. Large trees affect soil formation by bringing nutrients up from deep in the soil, by bringing soil material up from varying depths when blown over, and by providing large openings to be filled by material from above as large roots decay.

Relief

Relief, or lay of the land, influences soil formation because of its effect on moisture, temperature, and erosion. This influence, however, is modified somewhat by the influence of the other soil-forming factors. In Anderson County, slopes range from 0 to 40 percent. Most soils on uplands with slopes of less than 15 percent have a thick, well-developed profile. On slopes of 15 to 40 percent, the soils have thinner and less developed profiles.

On stream bottoms the slopes range from 0 to about 3 percent. Here, the soils are young because the parent material has been in place for a relatively short time.

Time

Time is necessary in the formation of soils. The length of time required for a soil to develop depends largely on the intensity of other soil-forming factors. The soils in Anderson County range from immature, or young, to mature. The young soils have very little profile development, and the mature soils have well-defined horizons.

On the smoother parts of the uplands the soils have generally developed to maturity. Examples of these mature soils are the Cecil soils. On the stronger slopes, geologic erosion has removed the soil material to some extent. Consequently, the soils on these slopes are shallower. Examples are the Pacolet and Gwinnett soils. On the first bottoms of streams, the soils are young because the material has not been in place long enough for soil horizons to form. The Toccoa is an example of a young soil.

Morphology of the soils

If a vertical cut is dug into a soil, several layers or horizons are evident. The differentiation of horizons is the result of many soil forming processes. These include the accumulation of organic matter, the leaching of soluble salts, reduction and translocation of iron, the formation of soil structure, physical weathering, such as freezing and thawing, and chemical weathering of primary minerals or rocks.

Some of these processes are continually taking place in all soils, but the number of active processes and the degree of their activity vary from one soil to another.

Most soils have three major horizons called A, B, and C (*12*). These major horizons may be further subdivided by the use of subscripts and letters to indicate changes within one horizon. An example would be the B2t horizon that represents a layer within the B horizon that has translocated clay illuviated from the A horizon.

The A horizon is the surface layer. The layer with the largest accumulation of organic matter is called an A1 horizon. If the soils are cleared and plowed, the surface layer becomes an Ap horizon. The A horizon is also the layer of maximum leaching or eluviation of clay and iron. When considerable leaching has taken place, an A2 horizon is formed just below the surface layer. Normally, it is the lightest colored horizon in the soil. It is well expressed in such soils as Appling and Durham soils.

The B horizon is beneath the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation of clay, iron, aluminum, or other compounds, leached from the A horizon. Cecil, Hiwassee, and Madison soils are among the soils that have a well-expressed B horizon.

The C horizon is below the A or B horizons. Some soils, such as Cartecay and Toccoa, have not formed a B horizon, and the C horizon is immediately below the A horizon. The C horizon consists of materials that are little altered by the soil-forming processes, but may be modified by weathering.

Well drained and moderately well drained soils in Anderson County have a red or yellowish-brown B horizon. These colors are mainly due to thin coatings of iron oxides on the sand, silt, and clay particles. A soil is considered well drained if it is free of gray (a chroma of 2 or less) mottles to a depth of at least 30 inches. All the soils in Anderson County are well drained except Cartecay and Chewacla, which are somewhat poorly drained. These somewhat poorly drained soils have gray mottles within about 10 to 24 inches of the surface.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stone line. A concentration of coarse fragments in soils that generally marks an old weathering surface. In a cross section, the line may be one fragment or more thick. The line generally overlies material that weathered in place and marks the top of a paleosol. It is ordinarily overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt*, *silt loam*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Illustrations

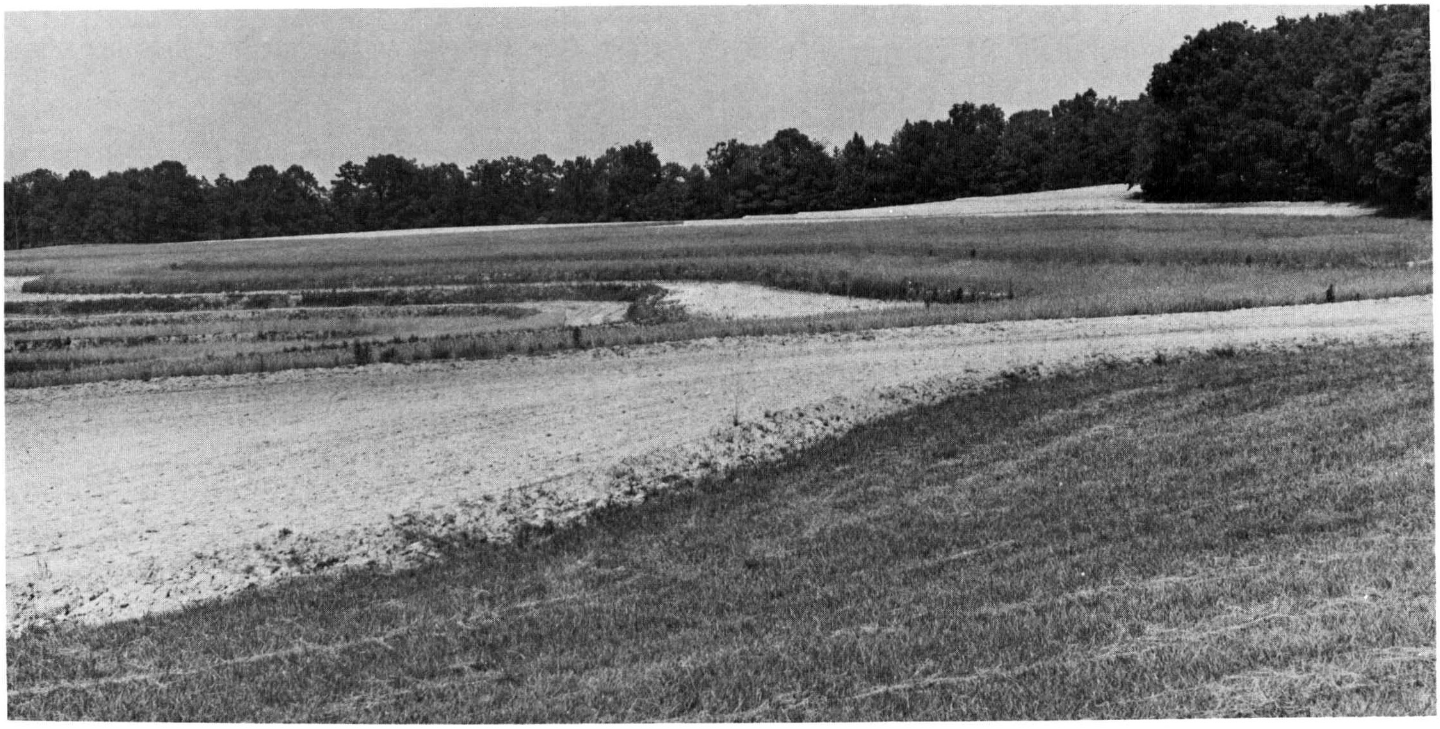

Figure 1.—Stripcropping and terraces reduce runoff on Appling sandy loam, 2 to 6 percent slopes.

Figure 2.—Flooding is a severe hazard on Cartecay-Chewacla complex.

Figure 3.—Wheat is well suited to Cecil sandy loam, 2 to 6 percent slopes.

Figure 4.—Bicolor lespedeza furnishes food and cover for wildlife. It is well suited to Hiwassee sandy loam, 2 to 6 percent slopes.

Figure 5.—Small grain on Madison sandy loam, 2 to 6 percent slopes, provides cover for the soil and winter grazing for cattle.

Figure 6.—Gullied area on Pacolet clay loam, 10 to 15 percent slopes, eroded.

Figure 7.—Flood damage can be severe unless roads and bridges are properly constructed on Toccoa-Cartecay complex.

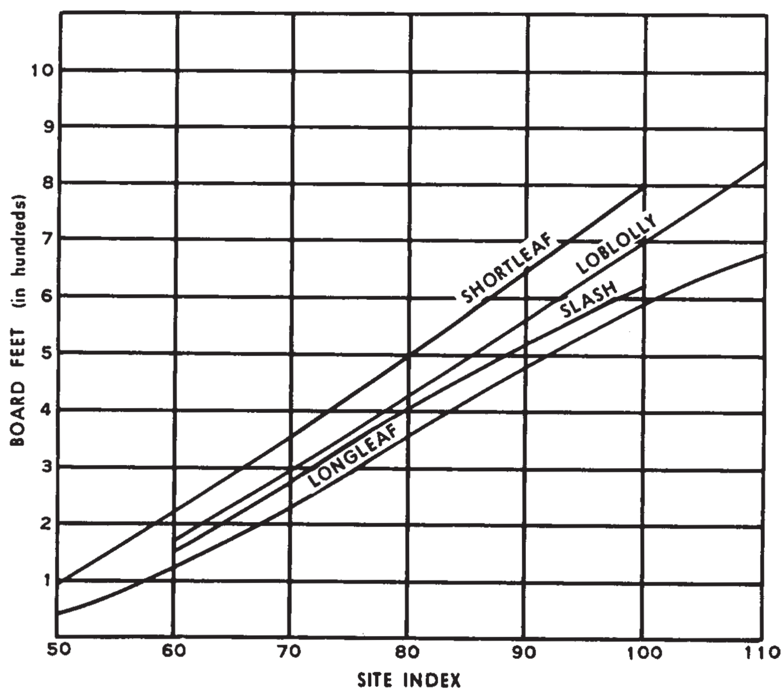

Figure 8.—Average yearly growth per acre in board feet for well-stocked, even-aged, managed stands of southern pines to age 60.

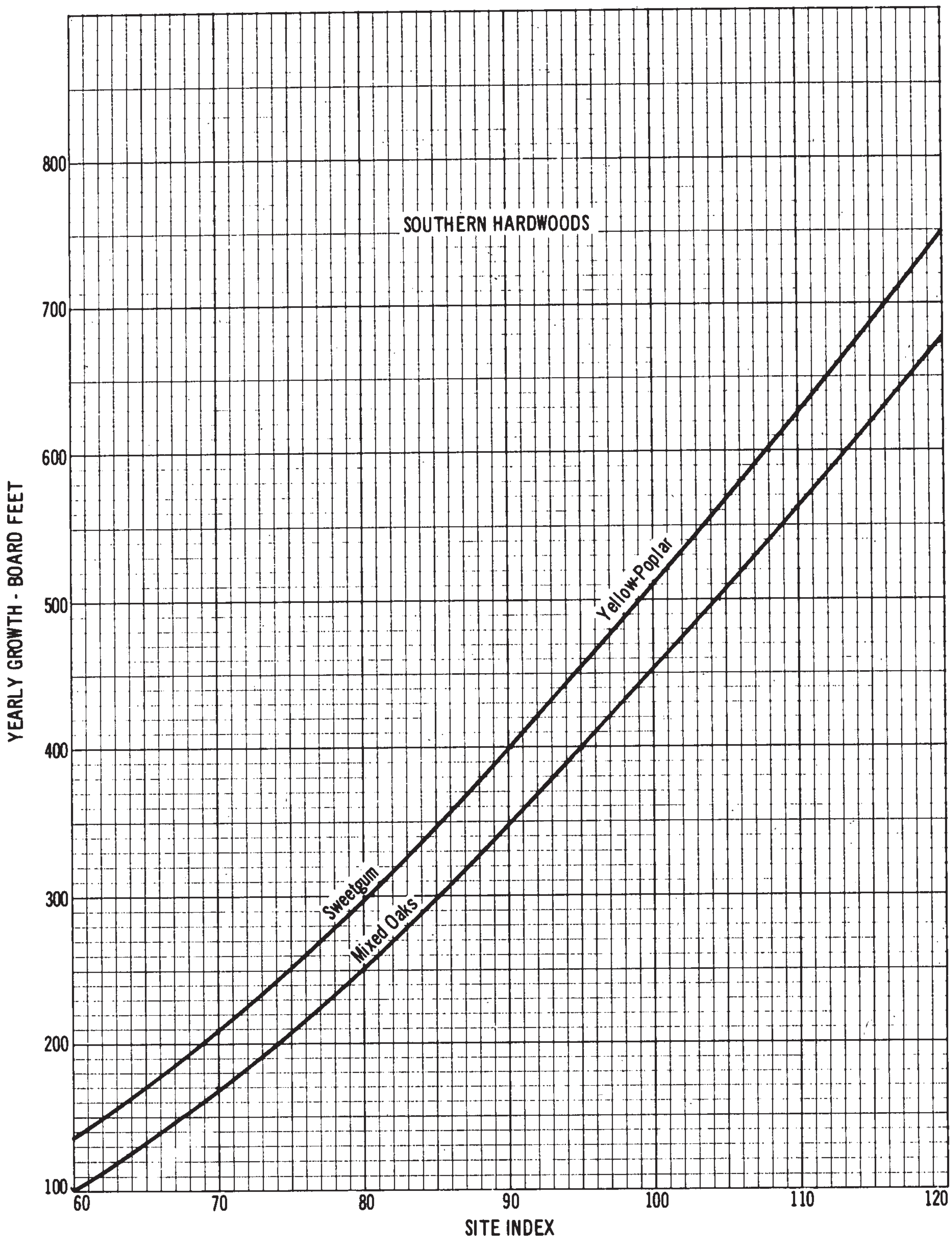

Figure 9.—Average yearly growth per acre in board feet for well-stocked, even-aged, managed stands of southern hardwoods to age 60.

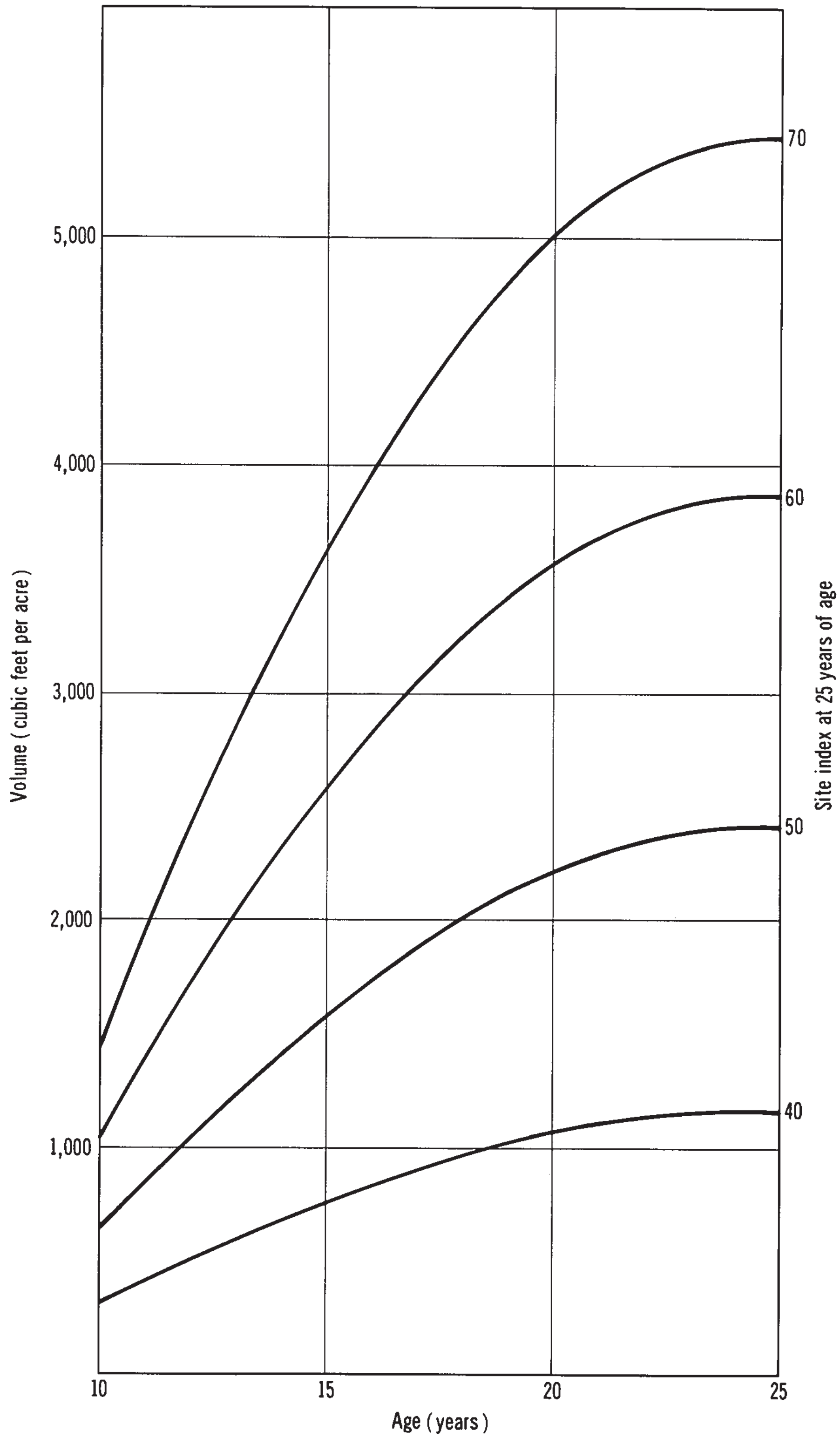

Figure 10.—Merchantable volume (inside bark) to 3 inch top, per acre for loblolly pine plantations, stocking 700 trees per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F	Units	In	In	In		In
January-----	52.9	32.6	42.8	74	10	41	4.03	2.68	5.26	7	1.0
February----	55.7	34.0	44.9	75	13	41	4.16	2.48	5.64	8	.9
March-------	63.0	40.2	51.6	82	22	148	5.27	3.37	6.99	8	.8
April-------	73.1	49.4	61.3	89	32	339	4.13	2.59	5.51	6	.0
May---------	80.8	57.8	69.4	95	39	601	3.59	1.96	4.91	6	.0
June--------	87.3	65.4	76.4	100	51	792	3.63	1.59	5.28	6	.0
July--------	89.8	69.2	79.5	100	60	915	4.13	2.02	5.84	6	.0
August------	89.1	68.6	78.9	99	58	896	3.97	1.96	5.61	6	.0
September---	83.2	62.8	73.0	95	47	690	3.38	1.10	5.18	5	.0
October-----	74.1	50.4	62.3	90	30	381	2.41	.72	3.76	4	.0
November----	63.4	40.0	51.8	83	20	109	3.00	1.42	4.27	5	.0
December----	54.5	34.4	44.5	74	13	54	4.16	2.20	5.75	7	.5
Year------	72.2	50.4	61.4	102	9	5,007	45.86	39.54	51.92	74	3.2

[1]Recorded in the period 1951-74 at Anderson, S.C.

[2]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Minumum temperature[1]		
	24 F or lower	28 F or lower	32 F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 19	March 31	April 15
2 years in 10 later than--	March 11	March 25	April 10
5 years in 10 later than--	February 24	March 14	March 31
First freezing temperature in fall:			
1 year in 10 earlier than--	November 9	October 28	October 25
2 years in 10 earlier than--	November 17	November 2	October 28
5 years in 10 earlier than--	December 1	November 12	November 4

[1]Recorded in the period 1951-74 at Anderson, S.C.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F	Higher than 28 F	Higher than 32 F
	Days	Days	Days
9 years in 10	245	224	201
8 years in 10	257	230	207
5 years in 10	279	243	217
2 years in 10	301	255	228
1 year in 10	313	261	233

[1]Recorded in the period 1951-74 at Anderson, S.C.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
ApB	Appling sandy loam, 2 to 6 percent slopes	15,609	3.3
ApC	Appling sandy loam, 6 to 10 percent slopes	3,311	0.7
Ca	Cartecay-Chewacla complex	18,920	4.0
CbB	Cataula sandy loam, 2 to 6 percent slopes	9,460	2.0
CbC	Cataula sandy loam, 6 to 10 percent slopes	4,730	1.0
CcC2	Cataula clay loam, 6 to 10 percent slopes, eroded	473	0.1
CdB	Cecil sandy loam, 2 to 6 percent slopes	109,736	23.2
CdC	Cecil sandy loam, 6 to 10 percent slopes	85,140	18.0
CdD	Cecil sandy loam, 10 to 15 percent slopes	28,853	6.1
CeB2	Cecil clay loam, 2 to 6 percent slopes, eroded	946	0.2
CeC2	Cecil clay loam, 6 to 10 percent slopes, eroded	7,095	1.5
CmB	Cecil-Urban land complex, 2 to 6 percent slopes	11,825	2.5
CmC	Cecil-Urban land complex, 6 to 10 percent slopes	6,149	1.3
DuB	Durham sandy loam, 2 to 6 percent slopes	1,419	0.3
GtE	Gwinnett sandy loam, 15 to 25 percent slopes	4,257	0.9
GtF	Gwinnett sandy loam, 25 to 40 percent slopes	473	0.1
HaB	Hiwassee sandy loam, 2 to 6 percent slopes	19,393	4.1
HaC	Hiwassee sandy loam, 6 to 10 percent slopes	19,866	4.2
HaD	Hiwassee sandy loam, 10 to 15 percent slopes	8,041	1.7
HwC2	Hiwassee clay loam, 6 to 10 percent slopes, eroded	1,419	0.3
HwD2	Hiwassee clay loam, 10 to 15 percent slopes, eroded	473	0.1
MaB	Madison sandy loam, 2 to 6 percent slopes	14,190	3.0
MaC	Madison sandy loam, 6 to 10 percent slopes	28,380	6.0
MaD	Madison sandy loam, 10 to 15 percent slopes	17,501	3.7
MaE	Madison sandy loam, 15 to 25 percent slopes	17,501	3.7
MdC2	Madison clay loam, 6 to 10 percent slopes, eroded	946	0.2
PaE	Pacolet sandy loam, 15 to 25 percent slopes	21,758	4.6
PaF	Pacolet sandy loam, 25 to 40 percent slopes	4,257	0.9
PcD2	Pacolet clay loam, 10 to 15 percent slopes, eroded	1,892	0.4
Tc	Toccoa-Cartecay complex	5,676	1.2
	Subtotal	469,689	99.3
	Water	3,311	0.7
	Total	473,000	100.00

TABLE 5.--YIELDS PER ACRE OF PASTURE AND HAY CROPS

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited.]

Soil series and map symbol	Tall fescue	Common bermuda-grass	Bahiagrass	Sorghums	Small grains	Sericea lespedeza	Improved bermuda-grass
	AUM[1]	AUM[1]	AUM[1]	AUM[1]	AUM[1]	Tons	Tons
Appling:							
ApB	7.0	7.0	7.0	9.5	6.0	3.0	4.0
ApC	6.5	6.5	6.5	9.0	5.5	2.5	3.6
Cartecay:							
[2]Ca:							
Cartecay part	7.0	6.5	6.5	9.5	6.0	---	4.2
Chewacla part	9.0	6.0	6.0	10.0	6.5	---	4.2
Cataula:							
CbB, CbC	6.5	6.5	6.5	9.0	6.0	3.0	4.0
CcC2	6.0	6.0	6.0	8.5	5.5	2.5	3.6
Cecil:							
CdB	7.0	7.0	7.0	9.5	6.0	3.0	4.0
CdC	6.5	6.5	6.5	9.0	5.5	2.5	3.6
CdD	6.0	6.0	6.0	8.5	5.0	2.0	3.3
CeB2, CeC2	6.0	6.0	6.5	8.5	5.5	2.5	3.3
CmB, CmC	---	---	---	---	---	---	---
Durham:							
DuB	6.5	7.0	7.0	9.5	6.0	3.0	4.0
Gwinnett:							
GtE	5.5	5.5	5.5	---	---	1.5	3.0
GtF	---	---	---	---	---	---	---
Hiwassee:							
HaB	7.0	7.0	7.0	9.5	6.0	3.0	4.0
HaC, HwC2	6.0	6.0	6.0	8.0	5.5	2.5	3.6
HaD, HwD2	5.5	5.5	5.5	7.5	4.5	2.0	3.3
Madison:							
MaB	7.0	7.0	7.0	9.5	6.0	3.0	4.0
MaC, MdC2	6.5	6.5	6.5	8.5	5.5	2.5	3.6
MaD	6.0	6.0	6.0	8.5	5.0	2.0	3.3
MaE	5.5	5.5	5.5	---	---	1.5	3.0
Pacolet:							
PaE	5.5	5.5	5.5	---	---	1.5	3.0
PaF	---	---	---	---	---	---	---
PcD2	5.5	5.5	5.5	8.0	4.5	1.5	3.0
Toccoa:							
[2]Tc:							
Toccoa part	6.5	7.0	7.0	9.0	5.5	---	4.2
Cartecay part	7.0	6.5	6.5	9.5	6.0	---	4.2

[1]AUM - Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 6.--YIELDS PER ACRE OF CROPS

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Cotton lint	Soybeans	Wheat	Oats	Grain sorghum	Barley
	Bu	Lb	Bu	Bu	Bu	Bu	Bu
Appling:							
ApB	95	650	35	45	75	65	45
ApC	80	600	30	40	65	55	40
Cartecay:							
[1]Ca	97	---	27	27	42	58	27
Cataula:							
CbB, CbC	70	700	30	50	85	60	50
CcC2	---	---	---	---	---	---	---
Cecil:							
CdB	95	750	40	50	90	65	50
CdC	90	700	35	45	85	55	45
CdD	80	600	25	---	75	45	---
CeB2	70	500	30	40	70	50	40
CeC2	60	---	---	---	60	---	---
[1]CmB	---	---	---	---	---	---	---
[1]CmC	---	---	---	---	---	---	---
Durham:							
DuB	85	700	35	45	75	50	45
Gwinnett:							
GtE	---	---	---	---	---	---	---
GtF	---	---	---	---	---	---	---
Hiwassee:							
HaB	95	550	40	50	90	60	50
HaC	85	500	30	40	80	55	40
HaD	75	450	---	---	70	50	---
HwC2	70	375	---	---	65	45	---
HwD2	---	---	---	---	---	---	---
Madison:							
MaB	90	700	40	50	85	55	50
MaC	80	600	30	40	75	50	40
MaD	70	500	---	---	60	45	---
MaE	---	---	---	---	---	---	---
MdC2	60	---	---	---	60	40	---
Pacolet:							
PaE	---	---	---	---	---	---	---
PaF	---	---	---	---	---	---	---
PcD2	---	---	---	---	---	---	---
Toccoa:							
[1]Tc	89	---	25	25	40	65	25

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Cecil-Urban land complex excluded. Dashes mean no acreage.]

Class	Total Acreage	Major management concerns (subclass)	
		Erosion (e)	Wetness (w)
		Acres	Acres
II	160,347	160,347	---
III	171,699	147,103	24,596
IV	68,585	68,585	---
VI	46,354	46,354	---
VII	4,730	4,730	---
Total	451,715	427,119	24,596

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Appling:							
ApB, ApC	3o	Slight	Slight	Slight	Loblolly pine	81	Eastern redcedar,
					Shortleaf pine	65	eastern white pine,
					Scarlet oak	68	loblolly pine,
					Southern red oak	76	yellow-poplar.
					Virginia pine	74	
					White oak	71	
					Yellow-poplar	90	
Cartecay:							
[1]Ca:							
Cartecay part	2w	Slight	Moderate	Slight	Loblolly pine	95	Loblolly pine,
					Sweetgum	95	sweetgum,
					Yellow-poplar	105	yellow-poplar,
					Water oak	85	water oak,
					Southern red oak	85	American sycamore,
							eastern cottonwood.
Chewacla part	1w	Slight	Moderate	Moderate	Loblolly pine	96	Loblolly pine,
					Yellow-poplar	104	green ash,
					American sycamore	90	American sycamore,
					Sweetgum	97	yellow-poplar,
					Water oak	86	sweetgum,
					Eastern cottonwood	100	eastern white pine.
					Green ash	97	
					Southern red oak	90	
Cataula:							
CbB, CbC	3o	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine,
					Shortleaf pine	66	southern red oak,
					Scarlet oak	84	yellow-poplar,
					White oak	81	white oak.
					Yellow-poplar	88	
CcC2	5c	Moderate	Moderate	Moderate	Loblolly pine	65	Loblolly pine,
					Shortleaf pine	55	Virginia pine.
Cecil:							
CdB, CdC, CdD	3o	Slight	Slight	Slight	Eastern white pine	80	Eastern white pine,
					Loblolly pine	80	loblolly pine,
					Shortleaf pine	69	yellow-poplar.
					Virginia pine	73	
					Black oak	66	
					Northern red oak	82	
					Post oak	65	
					Scarlet oak	80	
CeB2, CeC2	4c	Moderate	Moderate	Moderate	Loblolly pine	72	Loblolly pine,
					Shortleaf pine	66	Virginia pine.
					Virginia pine	65	
[1]CmB:							
Cecil part	3o	Slight	Slight	Slight	Eastern white pine	80	Eastern white pine,
					Loblolly pine	80	loblolly pine,
					Shortleaf pine	69	yellow-poplar.
					Virginia pine	73	
					Black oak	66	
					Northern red oak	82	
					Post oak	65	
					Scarlet oak	80	
Urban land part.							

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Cecil:							
[1]CmC:							
Cecil part	3o	Slight	Slight	Slight	Eastern white pine	80	Eastern white pine, loblolly pine, yellow-poplar.
					Loblolly pine	80	
					Shortleaf pine	69	
					Virginia pine	73	
					Black oak	66	
					Northern red oak	82	
					Post oak	65	
					Scarlet oak	80	
Urban land part.							
Durham:							
DuB	3o	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, yellow-poplar.
					Post oak	70	
					Shortleaf pine	72	
					Southern red oak	80	
					Sweetgum	80	
					White oak	70	
					Yellow-poplar	80	
Gwinnett:							
GtE, GtF	3r	Moderate	Moderate	Slight	Loblolly pine	81	Loblolly pine, Virginia pine, yellow-poplar.
					Southern red oak	72	
					White oak	69	
Hiwassee:							
HaB, HaC, HaD	3o	Slight	Slight	Slight	Loblolly pine	75	Loblolly pine, yellow-poplar.
					Northern red oak	70	
					Shortleaf pine	70	
					White oak	70	
					Yellow-poplar	85	
HwC2, HwD2	4c	Moderate	Moderate	Moderate	Loblolly pine	70	Loblolly pine, eastern redcedar, Virginia pine.
					Shortleaf pine	60	
Madison:							
MaB, MaC, MaD	3o	Slight	Slight	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar, longleaf pine.
					Longleaf pine	63	
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MaE	3r	Moderate	Moderate	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar, longleaf pine.
					Longleaf pine	63	
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MdC2	4c	Moderate	Moderate	Moderate	Loblolly pine	72	Eastern redcedar, loblolly pine, Virginia pine.
					Shortleaf pine	66	
					Longleaf pine	60	
					Virginia pine	66	
Pacolet:							
PaE, PaF	3r	Moderate	Moderate	Slight	Loblolly pine	78	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	
					Yellow-poplar	90	
PcD2	4c	Moderate	Moderate	Moderate	Loblolly pine	70	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	60	
					Yellow-poplar	80	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
Toccoa:							
[1]Tc:							
Toccoa part	1o	Slight	Slight	Slight	Loblolly pine	90	Loblolly pine,
					Yellow-poplar	107	yellow-poplar,
					Sweetgum	100	American sycamore,
					Southern red oak	---	cherrybark oak.
Cartecay part	2w	Slight	Moderate	Slight	Loblolly pine	95	Loblolly pine,
					Sweetgum	95	sweetgum,
					Yellow-poplar	105	yellow-poplar,
					Water oak	85	water oak,
					Southern red oak	85	American sycamore,
							eastern cottonwood.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Appling:					
ApB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Slight.
ApC	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Cartecay:					
[1]Ca:					
Cartecay part	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
Chewacla part	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Cataula:					
CbB	Moderate: cemented pan.	Moderate: low strength.	Moderate: cemented pan, low strength.	Moderate: low strength.	Moderate: low strength.
CbC	Moderate: cemented pan.	Moderate: low strength, slope.	Moderate: cemented pan, low strength, slope.	Severe: slope.	Moderate: low strength.
CcC2	Moderate: cemented pan.	Moderate: low strength, slope.	Moderate: cemented pan, low strength, slope.	Severe: slope.	Moderate: low strength.
Cecil:					
CdB, CeB2	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
CdC, CdD, CeC2	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
[1]CmB:					
Cecil part	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
Urban land part.					
[1]CmC:					
Cecil part	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
Urban land part.					
Durham:					
DuB	Slight	Slight	Slight	Moderate: slope.	Slight.
Gwinnett:					
GtE, GtF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hiwassee:					
HaB	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: slope.	Moderate: low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hiwassee:					
HaC, HaD, HwC2, HwD2	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Madison:					
MaB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
MaC, MaD, MdC2	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
MaE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pacolet:					
PaE, PaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PcD2	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Toccoa:					
[1]Tc:					
Toccoa part	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Cartecay part	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 10.--SANITARY FACILITIES

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Appling:					
ApB	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
ApC	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Cartecay:					
[1]Ca:					
Cartecay part	Severe: wetness, floods.	Severe: wetness, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Chewacla part	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Good.
Cataula:					
CbB, CbC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
CcC2	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Cecil:					
CdB, CeB2	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
CdC, CdD, CeC2	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
[1]CmB:					
Cecil part	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Fair: too clayey.
Urban land part.					
[1]CmC:					
Cecil part	Moderate: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
Urban land part.					
Durham:					
DuB	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Gwinnett:					
GtE	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
GtF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Hiwassee:					
HaB	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Hiwassee:					
HaC, HaD, HwC2, HwD2	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
Madison:					
MaB	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
MaC, MaD, MdC2	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
MaE	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Pacolet:					
PaE	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
PaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PcD2	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Toccoa:					
[1]Tc:					
Toccoa part	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Cartecay part	Severe: wetness, floods.	Severe: wetness, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Appling:				
ApB, ApC	Fair: low strength, area reclaim.	Unsuited	Unsuited	Fair: thin layer.
Cartecay:				
[1]Ca:				
Cartecay part	Fair: wetness.	Poor: excess fines.	Poor: excess fines.	Good.
Chewacla part	Poor: wetness, low strength.	Unsuited	Unsuited	Good.
Cataula:				
CbB, CbC, CcC2	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer.
Cecil:				
CdB, CdC, CdD, CeB2, CeC2	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer.
[1]CmB:				
Cecil part	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Urban land part.				
[1]CmC:				
Cecil part	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Urban land part.				
Durham:				
DuB	Good	Unsuited	Unsuited	Fair: too sandy, thin layer.
Gwinnett:				
GtE	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer.
GtF	Poor: slope.	Unsuited	Unsuited	Poor: thin layer.
Hiwassee:				
HaB, HaC, HaD, HwC2, HwD2	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer, too clayey.
Madison:				
MaB, MaC, MaD, MdC2	Poor: low strength.	Unsuited	Unsuited	Poor: thin layer.
MaE	Poor: low strength.	Unsuited	Unsuited	Poor: slope, thin layer.
Pacolet:				
PaE	Fair: low strength, slope.	Unsuited	Unsuited	Poor: thin layer, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pacolet:				
PaF	Poor: slope.	Unsuited	Unsuited	Poor: thin layer, slope.
PcD2	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer.
Toccoa:				
[1]Tc:				
Toccoa part	Good	Poor: excess fines.	Unsuited	Good.
Cartecay part	Fair: wetness.	Poor: excess fines.	Poor: excess fines.	Good.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 12.--WATER MANAGEMENT

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Appling:						
ApB	Moderate: seepage.	Moderate: low strength, compressible.	Not needed	Favorable	Favorable	Favorable.
ApC	Moderate: seepage.	Moderate: low strength, compressible.	Not needed	Slope	Slope	Favorable.
Cartecay:						
[1]Ca:						
Cartecay part	Moderate: seepage.	Moderate: piping.	Favorable	Floods	Not needed	Not needed.
Chewacla part	Moderate: seepage.	Moderate: piping.	Poor outlets, floods.	Wetness, floods.	Not needed	Not needed.
Cataula:						
CbB, CbC	Slight	Moderate: compressible, low strength.	Not needed	Complex slope, erodes easily, percs slowly.	Favorable	Favorable.
CcC2	Slight	Moderate: compressible, low strength.	Not needed	Complex slope, erodes easily, percs slowly.	Complex slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Cecil:						
CdB, CdC, CdD, CeB2, CeC2	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Complex slope	Complex slope	Complex slope.
[1]CmB:						
Cecil part	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Complex slope	Complex slope	Complex slope.
Urban land part.						
[1]CmC:						
Cecil part	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Complex slope	Complex slope	Complex slope.
Urban land part.						
Durham:						
DuB	Moderate: seepage.	Slight	Not needed	Favorable	Favorable	Favorable.
Gwinnett:						
GtE, GtF	Moderate: depth to rock, seepage.	Moderate: compressible, low strength.	Not needed	Slope	Slope	Slope.
Hiwassee:						
HaB	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Favorable	Favorable	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Hiwassee:						
HaC, HwC2	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Slope	Favorable	Favorable.
HaD, HwD2	Moderate: seepage.	Moderate: compressible, low strength.	Not needed	Slope	Slope	Slope.
Madison:						
MaB	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed	Favorable	Favorable	Favorable.
MaC, MaD, MaE, MdC2	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed	Slope, erodes easily.	Erodes easily, slope.	Slope.
Pacolet:						
PaE, PaF, PcD2	Moderate: seepage, slope.	Moderate: low strength, compressible.	Not needed	Complex slope, erodes easily.	Complex slope, erodes easily.	Slope, erodes easily.
Toccoa:						
[1]Tc:						
Toccoa part	Severe: seepage.	Moderate: piping.	Not needed	Floods, seepage.	Not needed	Not needed.
Cartecay part	Moderate: seepage.	Moderate: piping.	Favorable	Floods	Not needed	Not needed.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 13.--RECREATIONAL DEVELOPMENT

[Terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Appling:				
ApB	Slight	Slight	Moderate: slope.	Slight.
ApC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Cartecay:				
[1]Ca:				
Cartecay part	Severe: floods.	Moderate: floods, wetness.	Moderate: floods, wetness.	Moderate: wetness.
Chewacla part	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Moderate: wetness, floods.
Cataula:				
CbB, CbC	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
CcC2	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.
Cecil:				
CdB	Slight	Slight	Moderate: slope.	Slight.
CdC, CdD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CeB2	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
CeC2	Moderate: slope, too clayey.	Moderate: slope too clayey.	Severe: slope.	Moderate: too clayey.
[1]CmB:				
Cecil part	Slight	Slight	Moderate: slope.	Slight.
Urban land part.				
[1]CmC:				
Cecil part	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Urban land part.				
Durham:				
DuB	Slight	Slight	Moderate: slope.	Slight.
Gwinnett:				
GtE	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Gwinnett:				
GtF	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Hiwassee:				
HaB	Slight	Slight	Moderate: slope.	Slight.
HaC, HaD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HwC2, HwD2	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.
Madison:				
MaB	Slight	Slight	Moderate: slope.	Slight.
MaC, MaD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MaE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
MdC2	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.
Pacolet:				
PaE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PcD2	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.
Toccoa:				
[1]Tc:				
Toccoa part	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Cartecay part	Severe: floods.	Moderate: floods, wetness.	Moderate: floods, wetness.	Moderate: wetness.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 14.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Appling:										
ApB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ApC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Cartecay:										
[1]Ca:										
Cartecay part	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
Chewacla part	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cataula:										
CbB, CbC	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CcC2	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Cecil:										
CdB	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CdC, CdD	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CeB2, CeC2	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
[1]CmB:										
Cecil part	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land part.										
[1]CmC:										
Cecil part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land part.										
Durham:										
DuB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gwinnett:										
GtE	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GtF	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Hiwassee:										
HaB	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaC, HaD	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HwC2, HwD2	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Madison:										
MaB	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaC, MaD	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaE	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
MdC2	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Pacolet:										
PaE, PaF	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PcD2	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Toccoa:										
[1]Tc:										
Toccoa part	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cartecay part	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Appling:										
ApB, ApC	0-11	Sandy loam	SM, SM-SC	A-2	86-100	80-100	55-75	15-35	<27	NP-5
	11-52	Sandy clay, clay loam, clay.	MH, CL, ML, SC	A-7	95-100	95-100	70-92	50-75	41-74	15-30
	52-76	Weathered bedrock.	---	---	---	---	---	---	---	---
Cartecay:										
[1]Ca:										
Cartecay part	0-10	Fine sandy loam	SM	A-2, A-4	90-100	75-100	60-80	20-50	---	NP
	10-38	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC	A-2, A-4	90-100	75-100	60-85	25-50	<30	NP-10
	38-47	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	80-100	35-95	25-80	5-35	---	NP
Chewacla part	0-5	Loam	ML, CL	A-4, A-5, A-6, A-7	98-100	95-100	70-100	55-90	36-50	4-20
	5-45	Sandy clay loam, loam, sandy loam.	SM, CL-ML, SM-SC, ML	A-4	96-100	95-100	60-80	36-70	<35	NP-7
	45-70	Variable	---	---	---	---	---	---	---	---
Cataula:										
CbB, CbC	0-5	Sandy loam	SM, SM-SC	A-2, A-4	95-100	90-100	65-85	20-40	<20	NP-7
	5-20	Clay, clay loam, sandy clay.	MH, ML, CL	A-7, A-6	98-100	90-100	80-95	60-85	36-72	11-38
	20-35	Sandy clay loam, sandy clay, clay loam.	MH, ML	A-5, A-7	98-100	90-100	85-95	51-90	41-75	2-30
	35-67	Sandy clay loam, clay loam.	CL, ML, CL-ML, SC	A-4, A-6	95-100	90-100	70-100	40-70	20-40	2-20
CcC2	0-3	Clay loam	CL-ML, SM-SC	A-6, A-4, A-7	95-100	90-100	65-95	36-80	25-48	9-20
	3-20	Clay, clay loam, sandy clay.	MH, ML	A-7, A-6	98-100	90-100	80-95	60-85	36-72	11-38
	20-35	Sandy clay loam, sandy clay, clay loam.	MH, ML	A-5, A-7	98-100	90-100	85-95	51-90	41-75	2-30
	35-67	Sandy clay loam, clay loam.	CL, ML, CL-ML, SC	A-4, A-6	95-100	90-100	70-100	40-70	20-40	2-20
Cecil:										
CdB, CdC, CdD	0-6	Sandy loam	SM, SM-SC	A-2, A-4	84-100	80-100	67-90	26-42	<30	NP-6
	6-53	Clay	MH, ML	A-7	97-100	92-100	72-99	55-95	41-80	9-37
	53-70	Weathered bedrock.	---	---	---	---	---	---	---	---
CeB2, CeC2	0-4	Clay loam	SM-SC, SC, CL, CL-ML	A-4, A-6	74-100	72-100	68-95	38-80	21-35	4-15
	4-53	Clay	MH, ML	A-7	97-100	92-100	72-99	55-95	41-80	9-37
	53-70	Weathered bedrock.	---	---	---	---	---	---	---	---
[1]CmB:										
Cecil part	0-6	Sandy loam	SM, SM-SC	A-2, A-4	84-100	80-100	67-90	26-42	<30	NP-6
	6-53	Clay	MH, ML	A-7	97-100	92-100	72-99	55-95	41-80	9-37
	53-70	Weathered bedrock.	---	---	---	---	---	---	---	---
Urban land part.										
[1]CmC:										
Cecil part	0-6	Sandy loam	SM, SM-SC	A-2, A-4	84-100	80-100	67-90	26-42	<30	NP-6
	6-53	Clay	MH, ML	A-7	97-100	92-100	72-99	55-95	41-80	9-37
	53-70	Weathered bedrock.	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Cecil:										
[1]CmC:										
Urban land part.										
Durham:										
DuB	0-13	Sandy loam	SM	A-2, A-4	100	90-100	60-70	18-40	<11	NP-3
	13-42	Sandy clay loam	SC, ML	A-6, A-4, A-5	100	95-100	65-75	36-55	28-48	7-22
	42-50	Weathered bedrock.	---	---	---	---	---	---	---	---
Gwinnett:										
GtE, GtF	0-3	Sandy loam	SM, SC, SM-SC	A-2, A-4, A-6	95-100	85-100	65-90	30-50	<32	NP-15
	3-36	Clay, sandy clay	MH, ML, CL, CH	A-7, A-6	95-100	90-100	75-95	51-80	38-65	16-30
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---
Hiwassee:										
HaB, HaC, HaD	0-5	Sandy loam	SM, SM-SC	A-4, A-2	95-100	90-100	70-95	30-50	<35	NP-7
	5-62	Clay, clay loam.	CL, ML, MH	A-7, A-6	95-100	95-100	80-100	60-95	36-70	11-30
	62-70	Weathered bedrock.	---	---	---	---	---	---	---	---
HwC2, HwD2	0-3	Clay loam	CL, ML, CL-ML	A-7, A-6, A-4	95-100	95-100	80-100	50-85	25-50	5-23
	3-62	Clay, clay loam.	CL, ML, MH	A-7, A-6	95-100	95-100	80-100	60-95	36-70	11-30
	62-70	Weathered bedrock.	---	---	---	---	---	---	---	---
Madison:										
MaB, MaC, MaD, MaE	0-6	Sandy loam	SC, SM-SC, SM	A-2, A-4	85-100	80-100	60-90	26-49	<35	NP-8
	6-34	Clay, clay loam	MH	A-7	90-100	85-100	75-97	57-85	43-82	12-43
	34-46	Weathered bedrock.	---	---	---	---	---	---	---	---
MdC2	0-3	Clay loam	CL	A-4, A-6	90-100	85-100	70-95	50-80	20-40	10-20
	3-34	Clay, clay loam	MH	A-7	90-100	85-100	75-97	57-85	43-82	12-43
	34-46	Weathered bedrock.	---	---	---	---	---	---	---	---
Pacolet:										
PaE, PaF	0-6	Sandy loam	SM, SM-SC	A-2	85-100	80-100	60-80	20-35	<30	NP-6
	6-31	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	80-100	80-100	60-95	51-75	38-60	11-27
	31-49	Weathered bedrock.	---	---	---	---	---	---	---	---
PcD2	0-2	Clay loam	SM, SM-SC, SC	A-4	95-100	90-100	65-85	36-50	20-40	4-17
	2-31	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	80-100	80-100	60-95	51-70	38-60	11-27
	31-49	Weathered bedrock.	---	---	---	---	---	---	---	---
Toccoa:										
[1]Tc:										
Toccoa part	0-9	Sandy loam	SM, ML	A-2, A-4	98-100	95-100	85-100	25-60	<30	NP-4
	9-73	Sandy loam, loam	SM, ML	A-2, A-4	95-100	90-100	60-100	30-55	<30	NP-4

See footnote at end of table.

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Toccoa:										
[1]Tc:										
Cartecay part---	0-10	Fine sandy loam	SM	A-2, A-4	90-100	75-100	60-80	20-50	---	NP
	10-38	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC	A-2, A-4	90-100	75-100	60-85	25-50	<30	NP-10
	38-47	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	80-100	35-95	25-80	5-35	---	NP

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Appling:									
ApB, ApC	0-11	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Moderate	0.20	4
	11-52	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	Moderate	Moderate	0.24	
	52-76	---	---	---	---	---	---	---	
Cartecay:									
[1]Ca:									
Cartecay part	0-10	6.0-20	0.06-0.10	5.1-6.5	Low	Low	Moderate	---	---
	10-38	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	---	
	38-47	6.0-20	0.06-0.09	5.1-6.5	Low	Low	Moderate	---	
Chewacla part	0-5	0.6-2.0	0.15-0.24	5.1-6.5	Low	High	Moderate	---	---
	5-45	0.6-2.0	0.12-0.20	5.1-6.5	Low	High	Moderate	---	
	45-70	---	---	---	---	---	---	---	
Cataula:									
CbB, CbC, CcC2	0-5	2.0-6.0	0.08-0.11	4.5-6.0	Low	Low	High	0.32	3
	5-20	0.2-0.6	0.13-0.18	4.5-5.5	Low	High	High	0.24	
	20-35	0.06-0.2	0.06-0.08	4.5-5.5	Low	Moderate	High	0.24	
	35-56	0.2-0.6	0.10-0.15	4.5-5.5	Low	Moderate	High	0.32	
Cecil:									
CdB, CdC, CdD	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	Moderate	Moderate	0.32	4
	6-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	53-70	---	---	---	---	---	---	---	
CeB2, CeC2	0-4	0.6-2.0	0.13-0.15	4.5-6.0	Low	Moderate	Moderate	0.32	3
	4-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	53-70	---	---	---	---	---	---	---	
[1]CmB:									
Cecil part	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	Moderate	Moderate	0.32	4
	6-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	53-70	---	---	---	---	---	---	---	
Urban land part.									
[1]CmC:									
Cecil part	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	Moderate	Moderate	0.32	4
	6-53	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	53-70	---	---	---	---	---	---	---	
Urban land part.									
Durham:									
DuB	0-13	2.0-6.0	0.07-0.12	4.5-6.0	Low	Moderate	Moderate	0.17	4
	13-42	0.6-2.0	0.12-0.16	4.5-5.5	Low	Moderate	Moderate	0.20	
	42-50	---	---	---	---	---	---	---	
Gwinnett:									
GtE, GtF	0-3	0.6-2.0	0.11-0.17	5.1-6.5	Low	High	Moderate	0.32	4
	3-36	0.6-2.0	0.11-0.16	5.1-6.5	Moderate	High	Moderate	0.28	
	36-45	---	---	---	---	---	---	---	
Hiwassee:									
HaB, HaC, HaD	0-7	0.6-2.0	0.10-0.14	4.5-6.5	Low	Moderate	Moderate	0.28	5
	7-61	0.6-2.0	0.12-0.15	4.5-6.5	Low	Moderate	Moderate	0.28	
	61-70	---	---	---	---	---	---	---	
HwC2, HwD2	0-3	0.6-2.0	0.12-0.15	4.5-6.5	Low	Moderate	Moderate	0.28	4
	3-62	0.6-2.0	0.12-0.15	4.5-6.5	Low	Moderate	Moderate	0.28	
	62-70	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Madison:									
MaB, MaC, MaD, MaE	0-6	2.0-6.0	0.11-0.15	4.5-6.0	Low	High	Moderate	0.28	4
	6-34	0.6-2.0	0.13-0.18	4.5-5.5	Low	High	Moderate	0.32	
	34-46	---	---	---	---	---	---	---	
MdC2	0-3	0.6-2.0	0.12-0.16	4.5-6.0	Low	High	Moderate	0.28	3
	3-34	0.6-2.0	0.13-0.18	4.5-5.5	Low	High	Moderate	0.32	
	34-46	---	---	---	---	---	---	---	
Pacolet:									
PaE, PaF	0-6	2.0-6.0	0.08-0.12	4.5-6.0	Low	Moderate	High	0.20	3
	6-31	0.6-2.0	0.12-0.15	4.5-6.0	Low	High	High	0.28	
	31-49	---	---	---	---	---	---	---	
PcD2	0-2	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	High	0.24	2
	2-31	0.6-2.0	0.12-0.15	4.5-6.0	Low	High	High	0.28	
	31-49	---	---	---	---	---	---	---	
Toccoa:									
[1]Tc:									
Toccoa part	0-9	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	0.10	4
	9-73	2.0-6.0	0.06-0.12	5.1-6.5	Low	Low	Moderate	0.10	
Cartecay part	0-10	6.0-20	0.06-0.10	5.1-6.5	Low	Low	Moderate	---	---
	10-38	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	---	
	38-47	6.0-20	0.06-0.09	5.1-6.5	Low	Low	Moderate	---	

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 17.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The symbol > means greater than]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock
		Frequency	Duration	Months	Depth	Kind	Months	Depth
					Ft			In
Appling:								
ApB, ApC	B	None	---	---	>6.0	---	---	>60
Cartecay:								
[1]Ca:								
Cartecay part	C	Common	Brief	Dec-Mar	0.5-1.5	Apparent	Jan-Apr	>60
Chewacla part	C	Common	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60
Cataula:								
CbB, CbC, CcC2	B	None	---	---	>6.0	---	---	>60
Cecil:								
CdB, CdC, CdD, CeB2, CeC2	B	None	---	---	>6.0	---	---	>60
[1]CmB:								
Cecil part	B	None	---	---	>6.0	---	---	>60
Urban land part.								
[1]CmC:								
Cecil part	B	None	---	---	>6.0	---	---	>60
Urban land part.								
Durham:								
DuB	B	None	---	---	>6.0	---	---	>60
Gwinnett:								
GtE, GtF	B	None	---	---	>6.0	---	---	20-40
Hiwassee:								
HaB, HaC, HaD, HwC2, HwD2	B	None	---	---	>6.0	---	---	>60
Madison:								
MaB, MaC, MaD, MaE, MdC2	B	None	---	---	>6.0	---	---	>60
Pacolet:								
PaE, PaF, PcD2	B	None	---	---	>6.0	---	---	>60
Toccoa:								
[1]Tc:								
Toccoa part	B	Common	Brief	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60
Cartecay part	C	Common	Brief	Dec-Mar	0.5-1.5	Apparent	Jan-Apr	>60

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 18.--ENGINEERING TEST DATA[1]

Soil name and location	Parent material	Report No.	Depth	Horizon	Mechanical analysis[2]: Percentage passing sieve: No. 10 (2.0 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	Percentage smaller than 0.005 mm	Liquid limit	Plasticity index	Classification: AASHTO[3]	Unified[4]
			In						Pct			
Appling sandy loam	S73SC-4-9											
3 1/4 miles west of Anderson Airport and 1,670 feet east of intersection of S.C. Highway 187 and S.C. Secondary Highway 261; about 650 feet south of S.C. Secondary Highway 261, and 30 feet east of field road.	Granite	I-26983	0-8	Ap	100	48	24	14	---	NP	A-2-4(0)	SM
		I-26984	26-42	B22t	100	73	62	52	52	19	A-7-5(10)	MH
		I-26985	52-76	C	100	74	57	44	46	16	A-7-5(7)	ML
Appling sandy loam	S73SC-4-6											
3 1/2 miles north of Belton, about 1/4 mile northwest of intersection of S.C. Highway 20 and S.C. Secondary Highway 29 on north side of S.C. Secondary Highway 29.	Granite Gneiss	I-26980	0-5	Ap	100	59	27	15	---	NP	A-2-4(0)	SM
		I-26981	17-31	B22t	100	92	80	65	65	15	A-7-5(14)	MH
		I-26982	43-60	C	100	69	52	30	33	9	A-4(3)	ML
Cartecay fine sandy loam	S71SC-4-7											
About 10 miles northeast of Pendleton, and about 8 miles west of Piedmont; about 1,980 feet south of S.C. Highway 88, 660 feet west of S.C Secondary Highway 567, and 50 feet northeast of Six and Twenty Creek.	Alluvial	I-26952	0-10	Ap	100	74	42	25	---	NP	A-4(1)	SM
		I-26953	10-19	C1	100	44	30	14	---	NP	A-2-4(0)	SM
		I-26954	19-23	C2	100	78	45	25	---	NP	A-4(2)	SM
		I-26955	23-38	C3g	100	77	26	15	---	NP	A-2-4(0)	SM
		I-26956	38-47	C4g	100	46	6	3	---	NP	A-3(0)	SP-SM
Cataula sandy loam	S72SC-4-3											
4 miles south of Belton, and about 500 feet north of intersection of S.C. Secondary Highway 107 and S.C. Secondary Highway 118, and about 10 feet east of S.C. Secondary Highway 107.	Granite Gneiss	I-26957	0-5	Ap	100	57	28	13	---	NP	A-2-4(0)	SM
		I-26958	5-10	B21t	100	75	60	48	37	14	A-6(7)	CL
		I-26959	20-35	Bx	100	81	69	57	51	13	A-7-5(10)	MH
Chewacla loam	S73SC-4-5											
6 1/4 miles west of Honea Path, 125 feet north of S.C. Highway 252 on flood plains of Hen Coop Creek, and 160 feet west of Hen Coop Creek.	Alluvial	I-26963	0-5	Ap	100	89	73	54	45	12	A-7-5(10)	ML
		I-26964	10-20	B21	100	67	47	28	---	NP	A-4(2)	SM
		I-26965	45-70	Cg	100	62	10	5	---	NP	A-3(0)	SP-SM
Durham loamy sand	S69SC-4-2											
1 mile south of Townville, 1 1/4 miles northwest of Fork Elementary School; about 500 feet west of unnumbered paved county highway that extends south southeast from S.C. Secondary Highway 117 at Townville School.	Granite	I-26966	0-6	Ap	100	44	18	10	---	NP	A-2-4(0)	SM
		I-26967	20-31	B22t	100	62	51	46	45	8	A-5(4)	ML
		I-26968	42-50	C	100	35	20	17	28	7	A-2-4(0)	SC

See footnotes at end of table.

TABLE 18.--ENGINEERING TEST DATA--Continued

Soil name and location	Parent material	Report No.	Depth	Horizon	Mechanical analysis[2]: Percentage passing sieve: No. 10 (2.0 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	Percentage smaller than 0.005 mm	Liquid limit	Plasticity index	Classification: AASHTO[3]	Unified[4]
			In						Pct			
Gwinnett sandy loam	S73SC-4-7											
1 mile east of crossing of S.C. Highway 184 over Savannah River, about 1/4 mile southeast of intersection of S.C. Highway 184 and unnumbered paved highway, and about 70 feet west of unnumbered paved highway.	Hornblende	I-26969	0-3	Ap	100	57	34	20	----	NP	A-2-4(0)	SM
		I-26970	3-30	B2t	100	67	53	44	54	17	A-7-5(8)	MH
		I-26971	36-45	C	100	81	70	63	50	9	A-5(9)	ML
Hiwassee sandy loam	S72SC-4-10											
4 miles west of Anderson, 3/4 mile south of S.C. Highway 24, and 1/4 mile east of Five Mile Creek.	Hornblende Gneiss	I-26972	0-5	Ap	100	60	39	28	29	7	A-4(1)	SM-SC
		I-26973	5-17	B21t	100	72	60	50	37	14	A-6(7)	CL
		I-26974	17-38	B22t	100	80	71	64	67	22	A-7-5(15)	MH
Pacolet sandy loam	S73SC-4-10											
7 miles southwest of Iva, and 4,600 feet northeast from Gregg Shoals on the Savannah River, and 70 feet south of S.C. Secondary Highway 36.	Granite Gneiss	I-26986	0-6	Ap	100	56	32	18	----	NP	A-2-4(0)	SM
		I-26987	6-22	B2t	100	74	58	44	49	21	A-7-6(10)	ML
		I-26988	31-49	C	100	64	44	32	37	12	A-6(3)	SM
Toccoa sandy loam	S70SC-4-1											
1 1/4 miles south of Savannah River Bridge on S. C. Highway 181, 600 feet east of Savannah River.	Alluvial	I-26978	0-9	Ap	100	73	25	12	----	NP	A-2-4(0)	SM
		I-26979	9-30	C1	100	78	31	21	----	NP	A-2-4(0)	SM

[1]Tests performed by South Carolina Highway Department.

[2]Mechanical analyses according to the AASHTO Designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[3]Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHTO Designation M 145-49.

[4]Based on the Unified Soil Classification System, Technical Memorandum No. 3-357, Volume 1, Waterways Experiment Station, Corps of Engineers, March 1953.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Cartecay	Coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents
Cataula	Clayey, kaolinitic, thermic Typic Fragiudults
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Durham	Fine-loamy, siliceous, thermic Typic Hapludults
Gwinnett	Clayey, kaolinitic, thermic Typic Rhodudults
Hiwassee	Clayey, kaolinitic, thermic Typic Rhodudults
Madison	Clayey, kaolinitic, thermic Typic Hapludults
Pacolet	Clayey, kaolinitic, thermic Typic Hapludults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents

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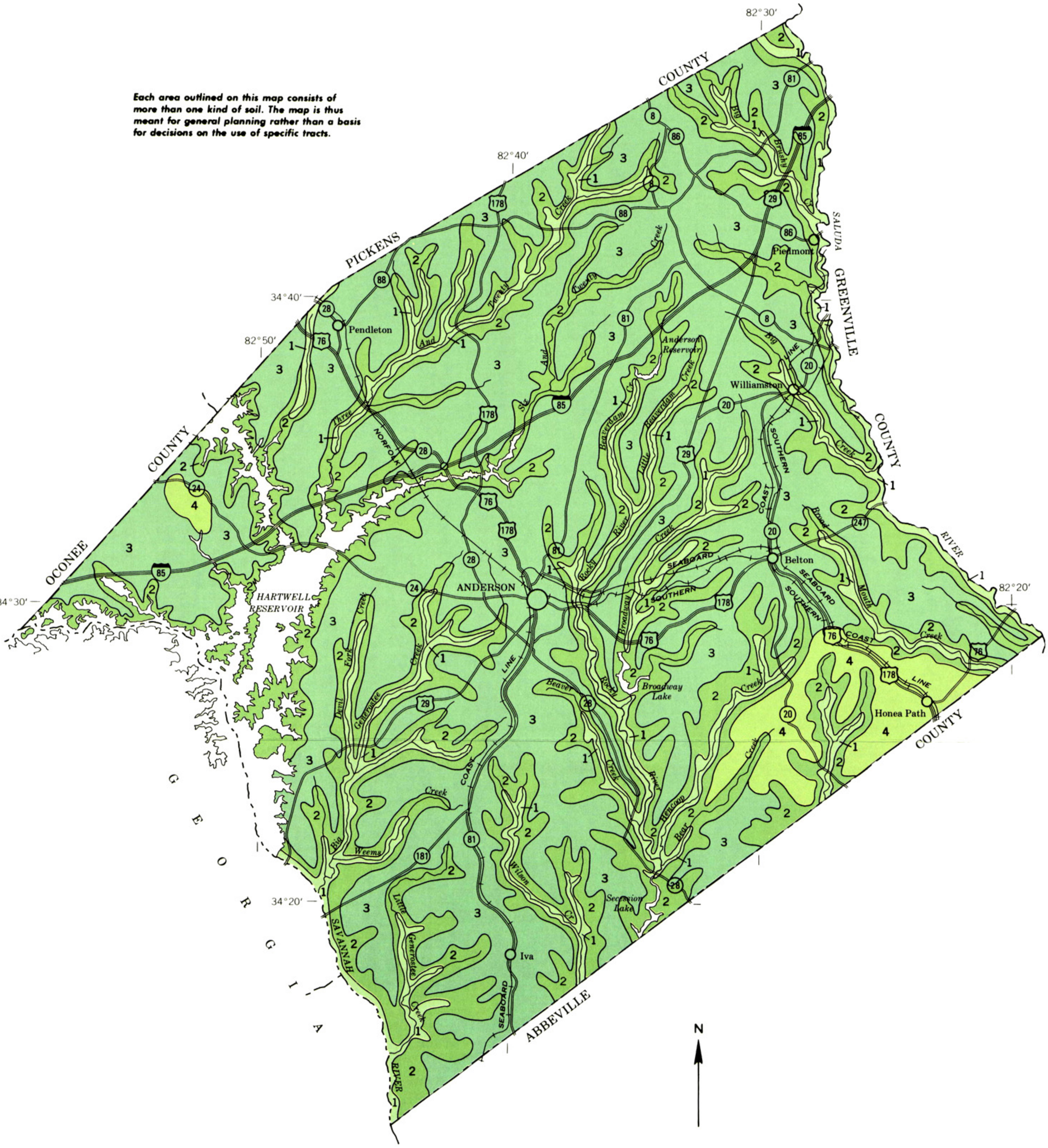
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SOIL ASSOCIATIONS

SOILS ON FLOOD PLAINS: LOAMY THROUGHOUT

1 CARTECAY–TOCCOA–CHEWACLA: Nearly level, somewhat poorly drained and well drained soils.

SOILS OF THE UPLAND: LOAMY SURFACE LAYERS AND MOSTLY CLAYEY SUBSOILS

2 MADISON–PACOLET: Strongly sloping to steep, dominantly moderately deep, well drained soils.

3 CECIL–HIWASSEE–MADISON: Gently sloping to strongly sloping, moderately deep to deep, well drained soils.

4 CECIL–APPLING–DURHAM: Gently sloping to sloping, deep, well drained soils.

Compiled 1977

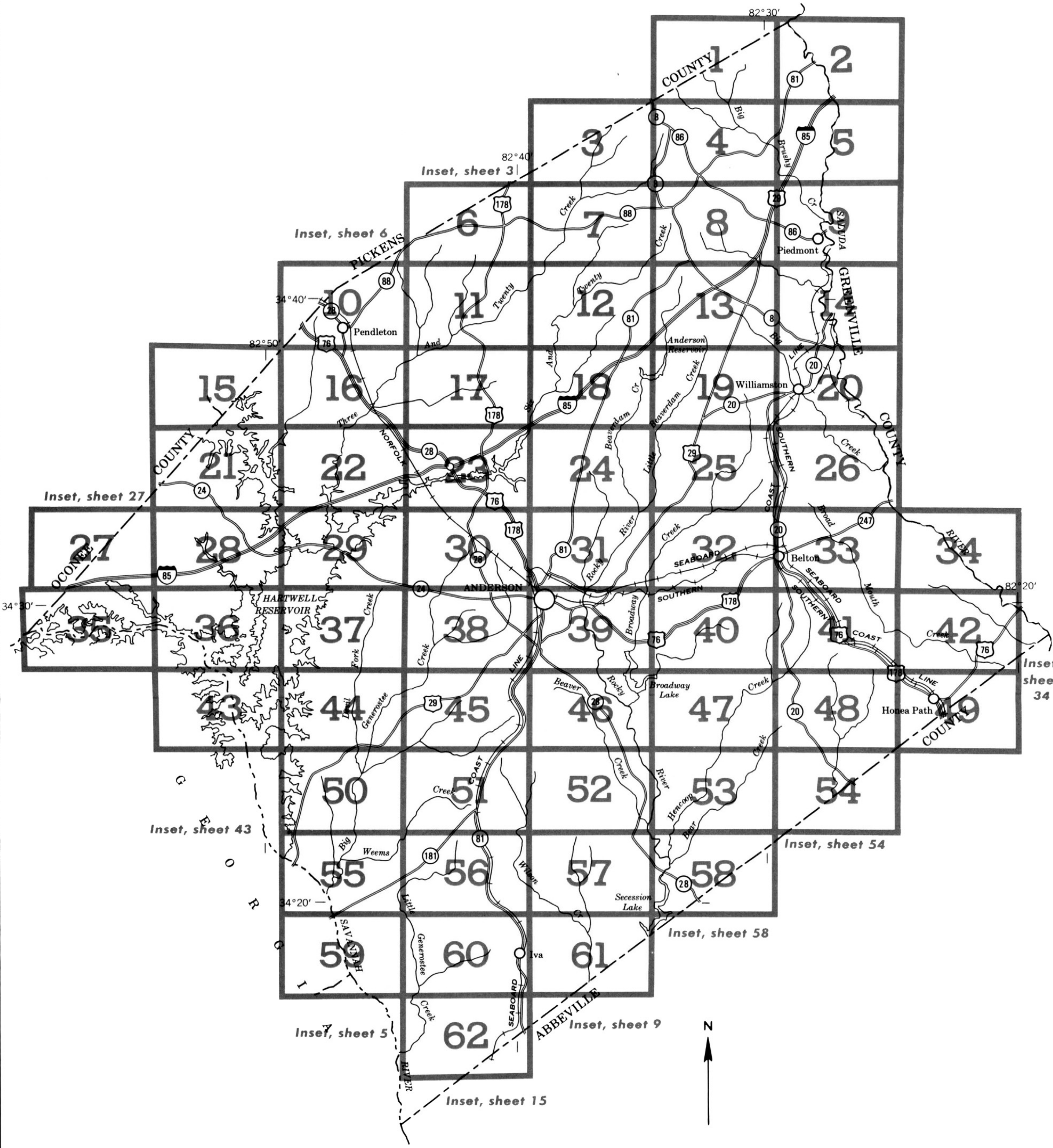
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION,
SOUTH CAROLINA LAND RESOURCES CONSERVATION COMMISSION

GENERAL SOIL MAP

ANDERSON COUNTY, SOUTH CAROLINA

Scale 1:253,440

1 0 1 2 3 4 Miles



INDEX TO MAP SHEETS

ANDERSON COUNTY, SOUTH CAROLINA

Scale 1: 253,440

1 0 1 2 3 4 Miles

SOIL LEGEND

The first capital letter is the initial one of the soil name. The second capital letter B, C, D, E, or F shows the slope class. Symbols without a slope letter are for level soils. A final number, 2, in the symbol shows the soil is eroded.

SYMBOL	NAME
ApB	Appling sandy loam, 2 to 6 percent slopes
ApC	Appling sandy loam, 6 to 10 percent slopes
Ca	Cartecay-Chewacla complex
CbB	Cataula sandy loam, 2 to 6 percent slopes
CbC	Cataula sandy loam, 6 to 10 percent slopes
CcC2	Cataula clay loam, 6 to 10 percent slopes, eroded
CdB	Cecil sandy loam, 2 to 6 percent slopes
CdC	Cecil sandy loam, 6 to 10 percent slopes
CdD	Cecil sandy loam, 10 to 15 percent slopes
CeB2	Cecil clay loam, 2 to 6 percent slopes, eroded
CeC2	Cecil clay loam, 6 to 10 percent slopes, eroded
CmB	Cecil-Urban land complex, 2 to 6 percent slopes
CmC	Cecil-Urban land complex, 6 to 10 percent slopes
DuB	Durham sandy loam, 2 to 6 percent slopes
GtE	Gwinnett sandy loam, 15 to 25 percent slopes
GtF	Gwinnett sandy loam, 25 to 40 percent slopes
HaB	Hiwassee sandy loam, 2 to 6 percent slopes
HaC	Hiwassee sandy loam, 6 to 10 percent slopes
HaD	Hiwassee sandy loam, 10 to 15 percent slopes
HwC2	Hiwassee clay loam, 6 to 10 percent slopes, eroded
HwD2	Hiwassee clay loam, 10 to 15 percent slopes, eroded
MaB	Madison sandy loam, 2 to 6 percent slopes
MaC	Madison sandy loam, 6 to 10 percent slopes
MaD	Madison sandy loam, 10 to 15 percent slopes
MaE	Madison sandy loam, 15 to 25 percent slopes
MdC2	Madison clay loam, 6 to 10 percent slopes, eroded
PaE	Pacolet sandy loam, 15 to 25 percent slopes
PaF	Pacolet sandy loam, 25 to 40 percent slopes
PcD2	Pacolet clay loam, 10 to 15 percent slopes, eroded
Tc	Toccoa-Cartecay complex

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — CeA; FoB2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

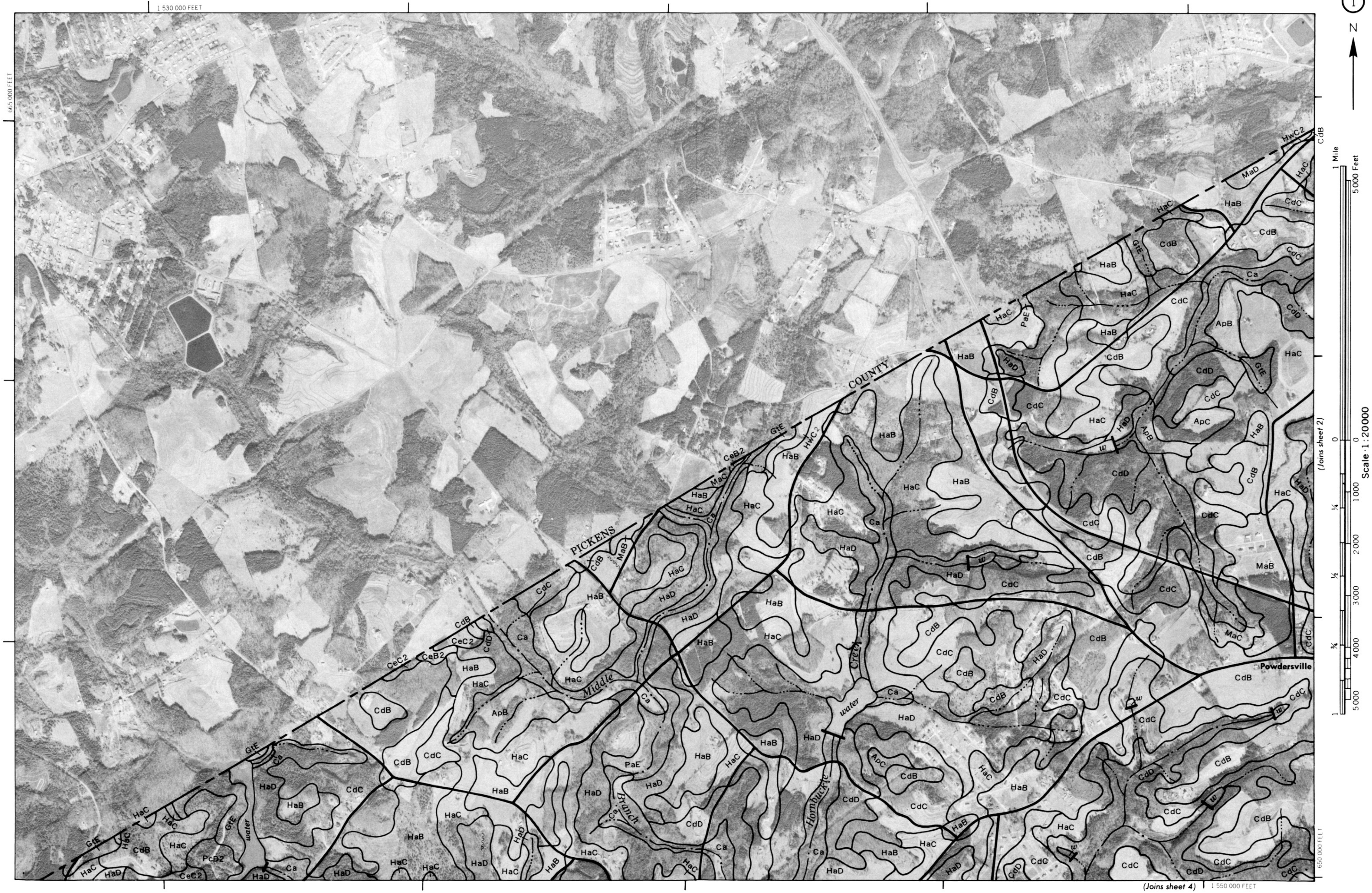
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot



ANDERSON COUNTY, SOUTH CAROLINA NO. 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

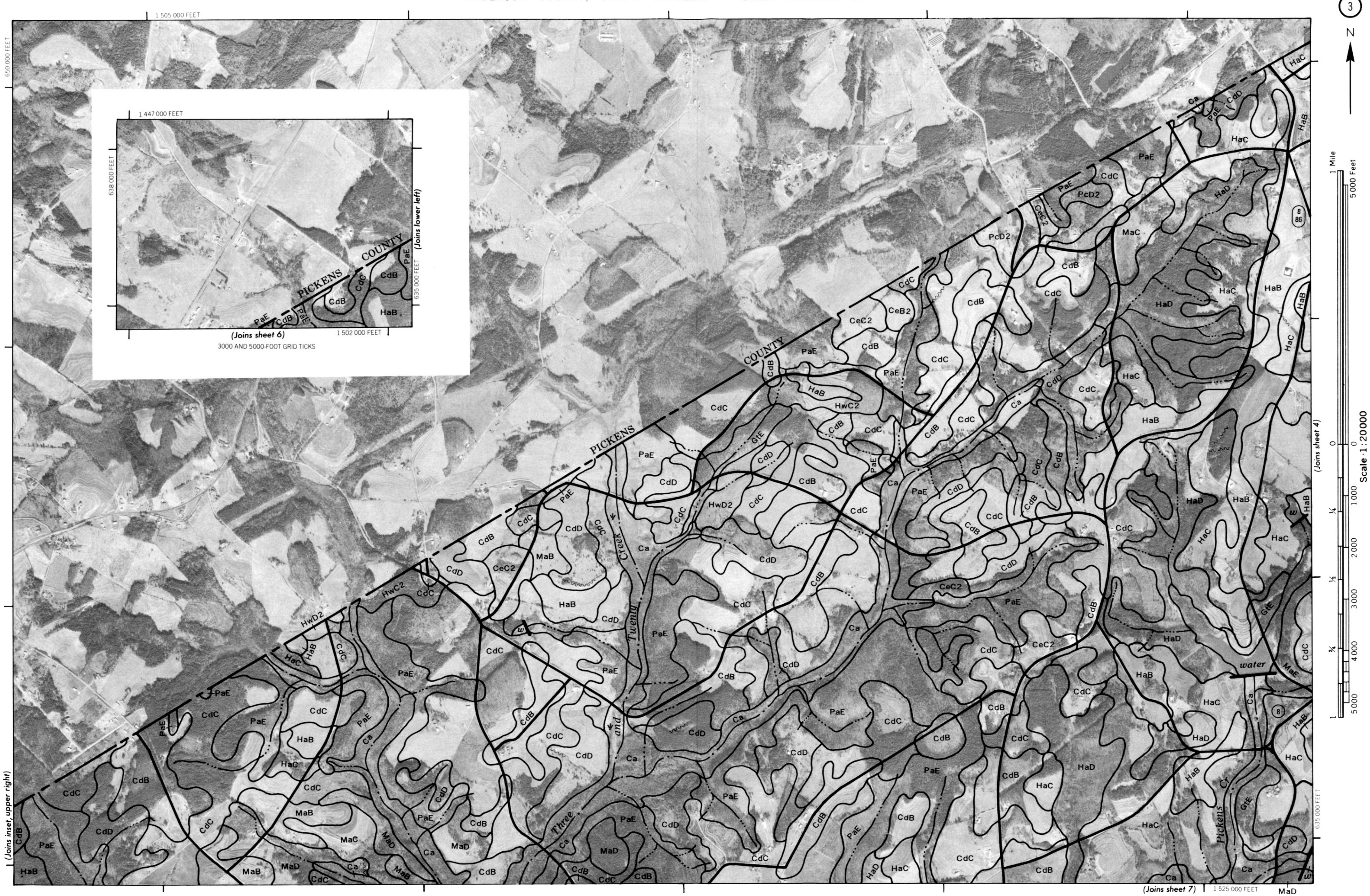
(2)

N

1 Mile
5 000 Feet
0
0
Scale 1:20000
1000
¼
2000
½
3000
¾
4000
5000
1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 2



ANDERSON COUNTY, SOUTH CAROLINA NO. 3

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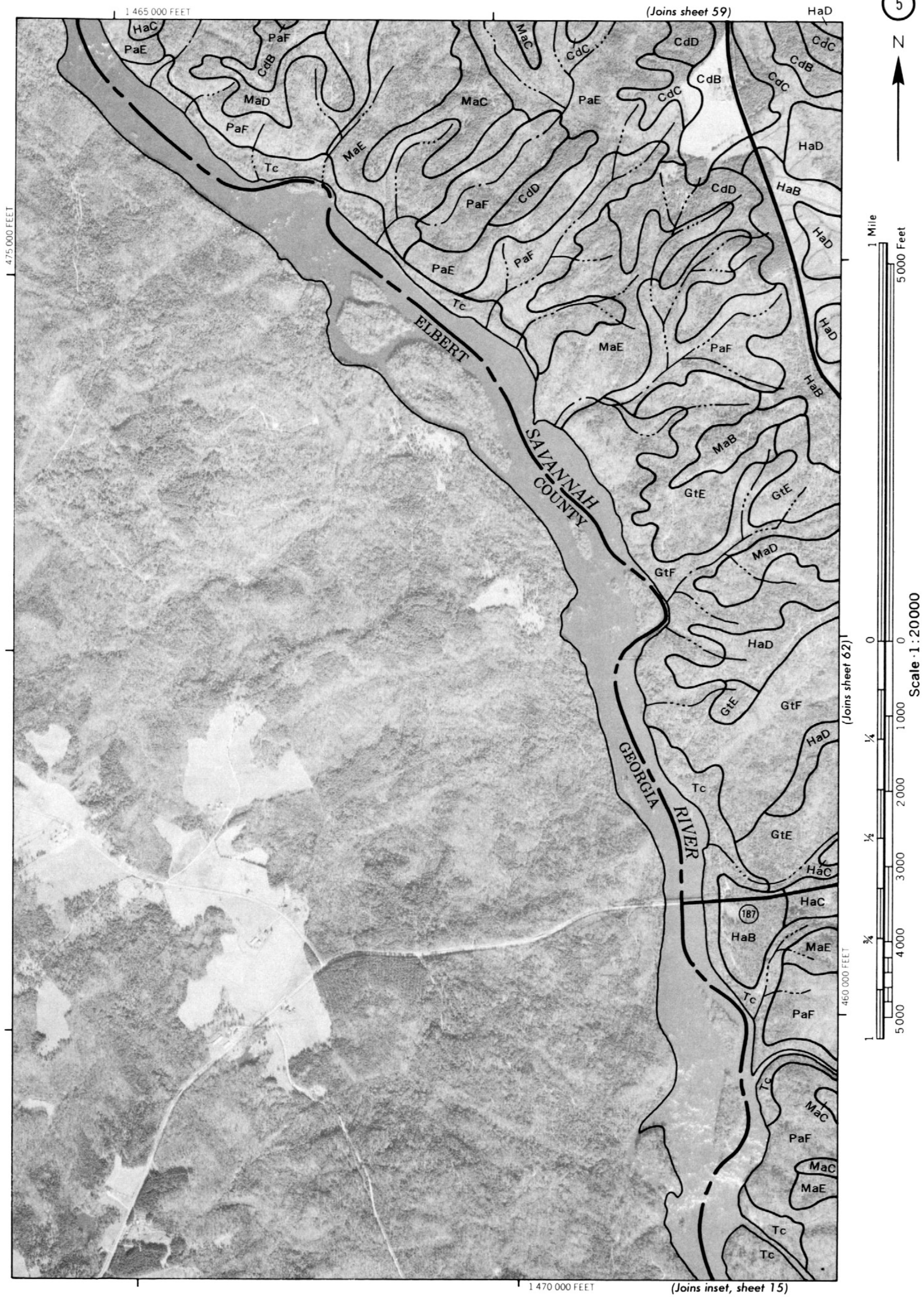
ANDERSON COUNTY, SOUTH CAROLINA NO. 4

ANDERSON COUNTY, SOUTH CAROLINA — SHEET NUMBER 5



ANDERSON COUNTY, SOUTH CAROLINA NO. 5

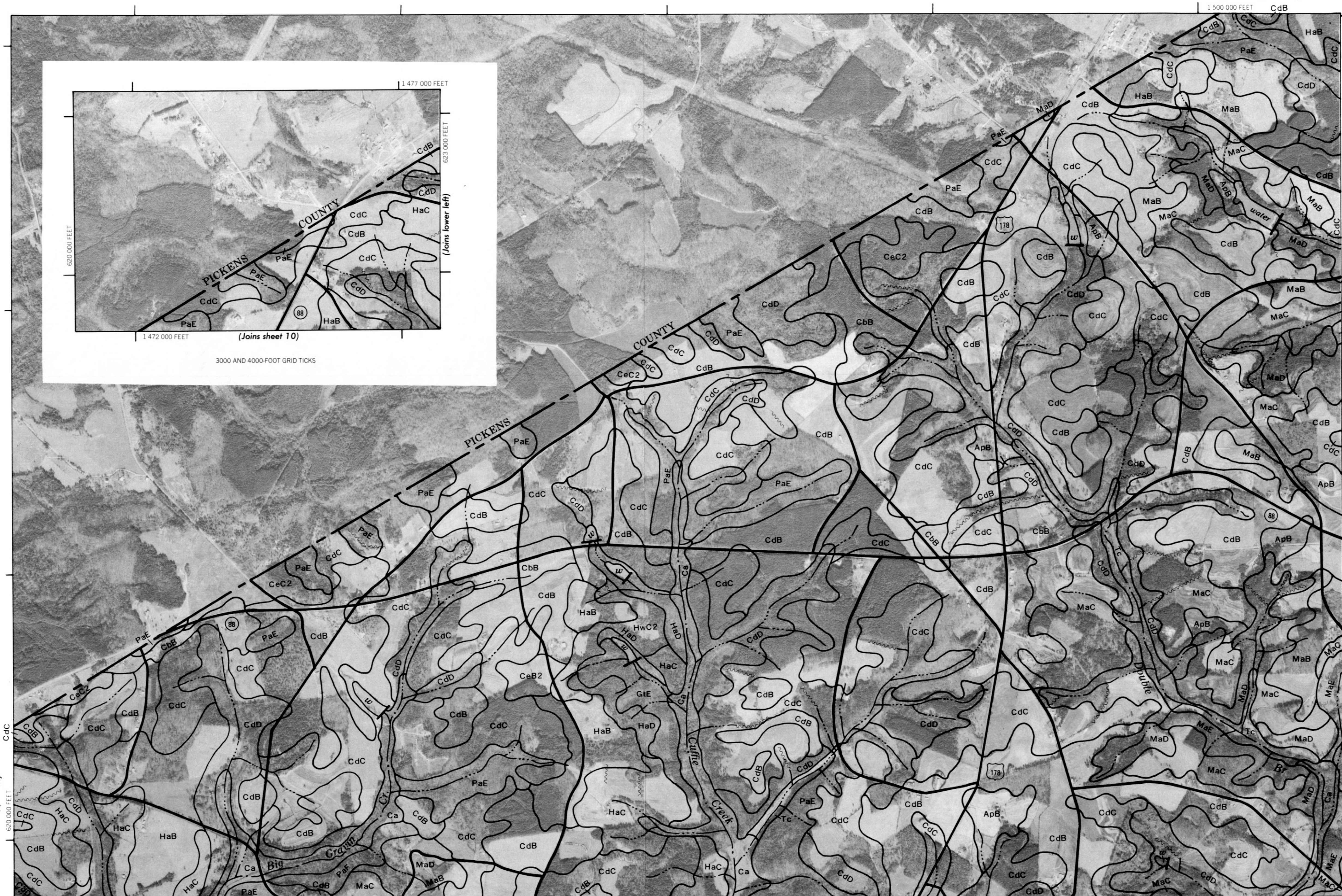
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

6

N

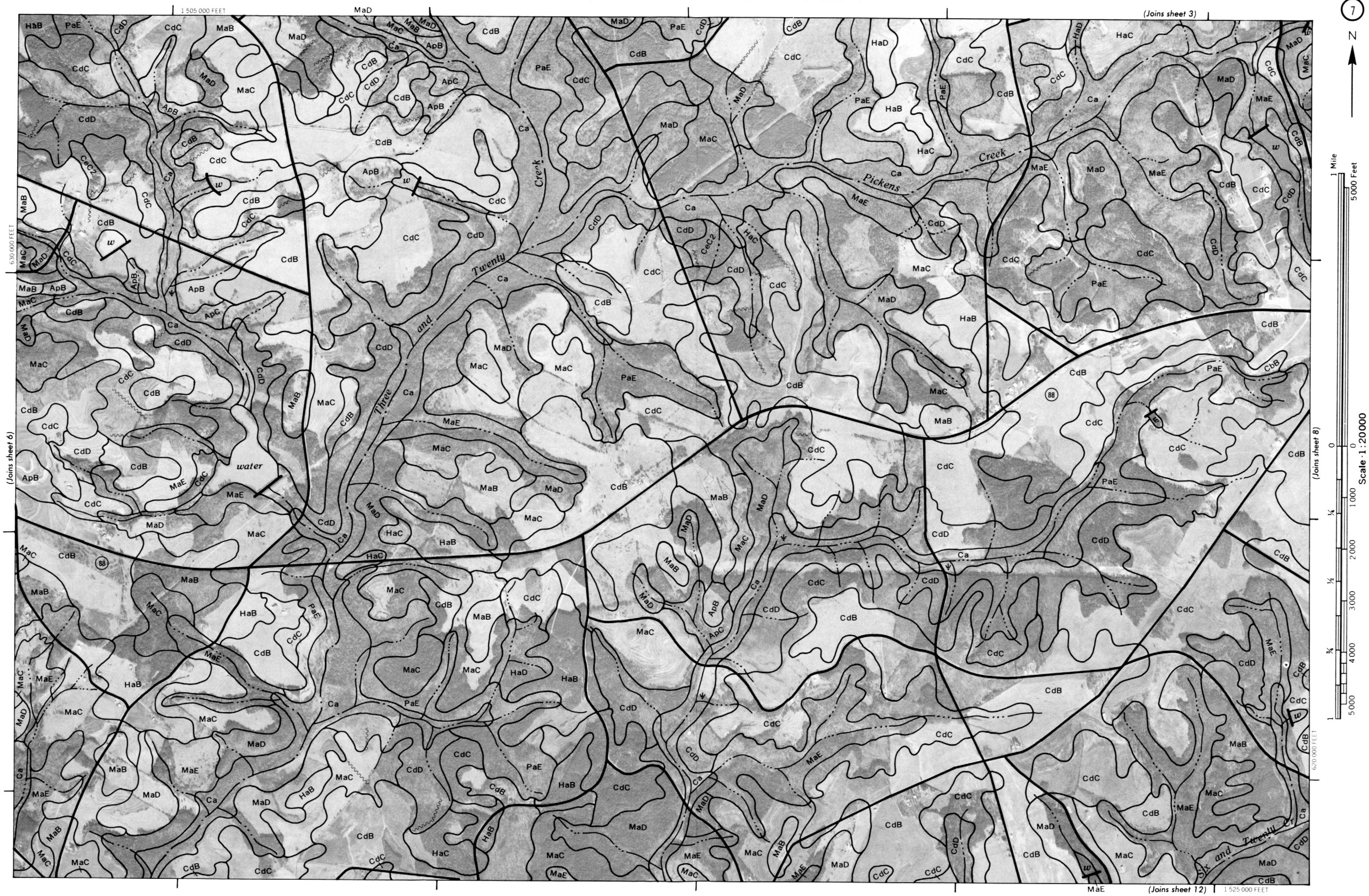
Scale 1:20000

1 Mile
5000 Feet
0
1000
2000
3000
4000
5000



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 6



ANDERSON COUNTY, SOUTH CAROLINA NO. 7

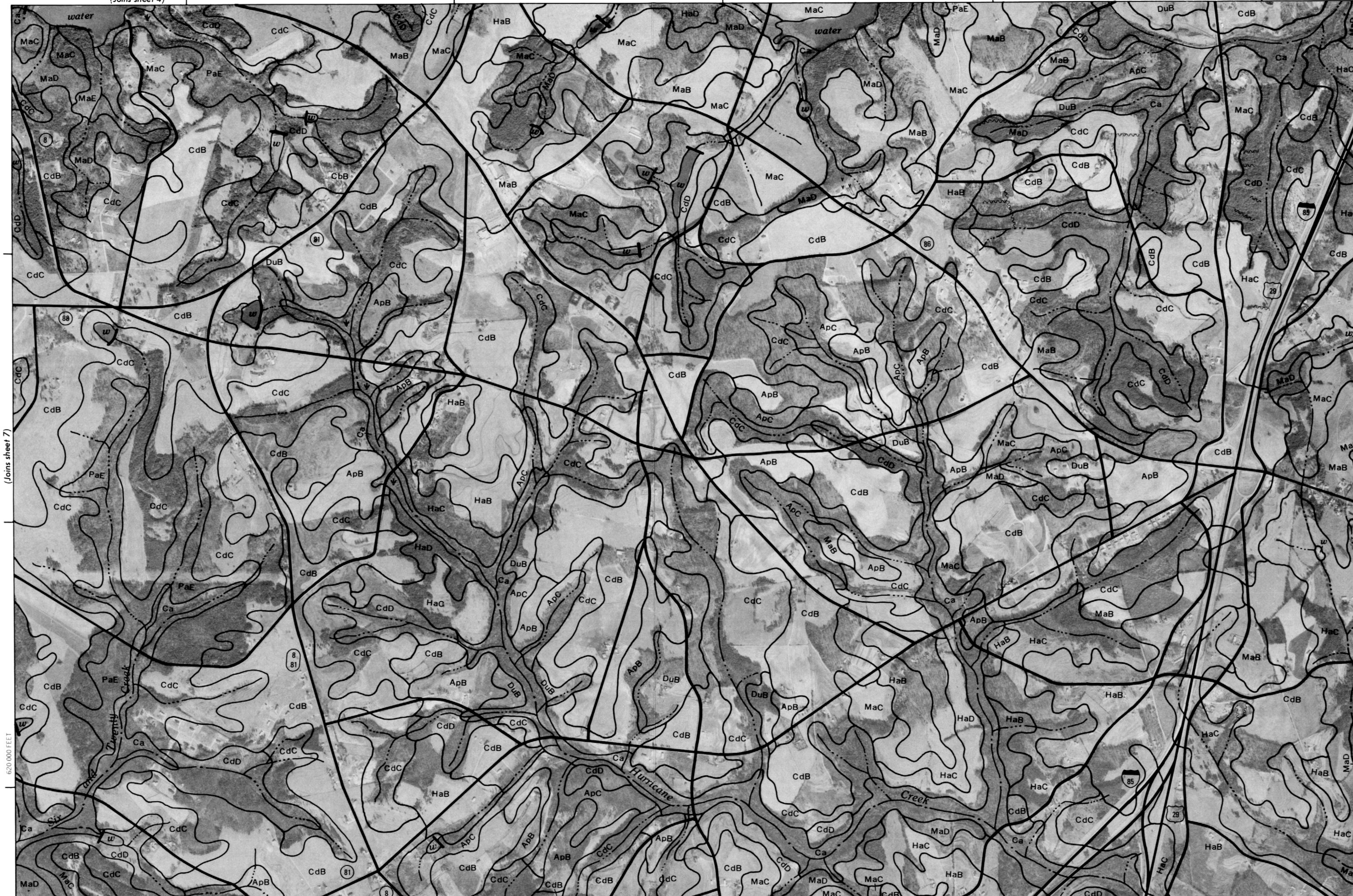
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

8

N

(Joins sheet 4)

1 550 000 FEET



(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 13)

1 530 000 FEET

630 000 FEET

620 000 FEET

1 Mile

5000 Feet

Scale 1:20000

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 8

9

N

1 Mile
5000 Feet
0
1/4
1/2
3/4
1
0
1000
2000
3000
4000
5000
Scale 1:20000

ANDERSON COUNTY, SOUTH CAROLINA NO. 9

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

10

N

Scale 1:20000

1 Mile ¾ ½ ¼ 0

5000 Feet 4000 3000 2000 1000 0

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ANDERSON COUNTY, SOUTH CAROLINA NO. 11

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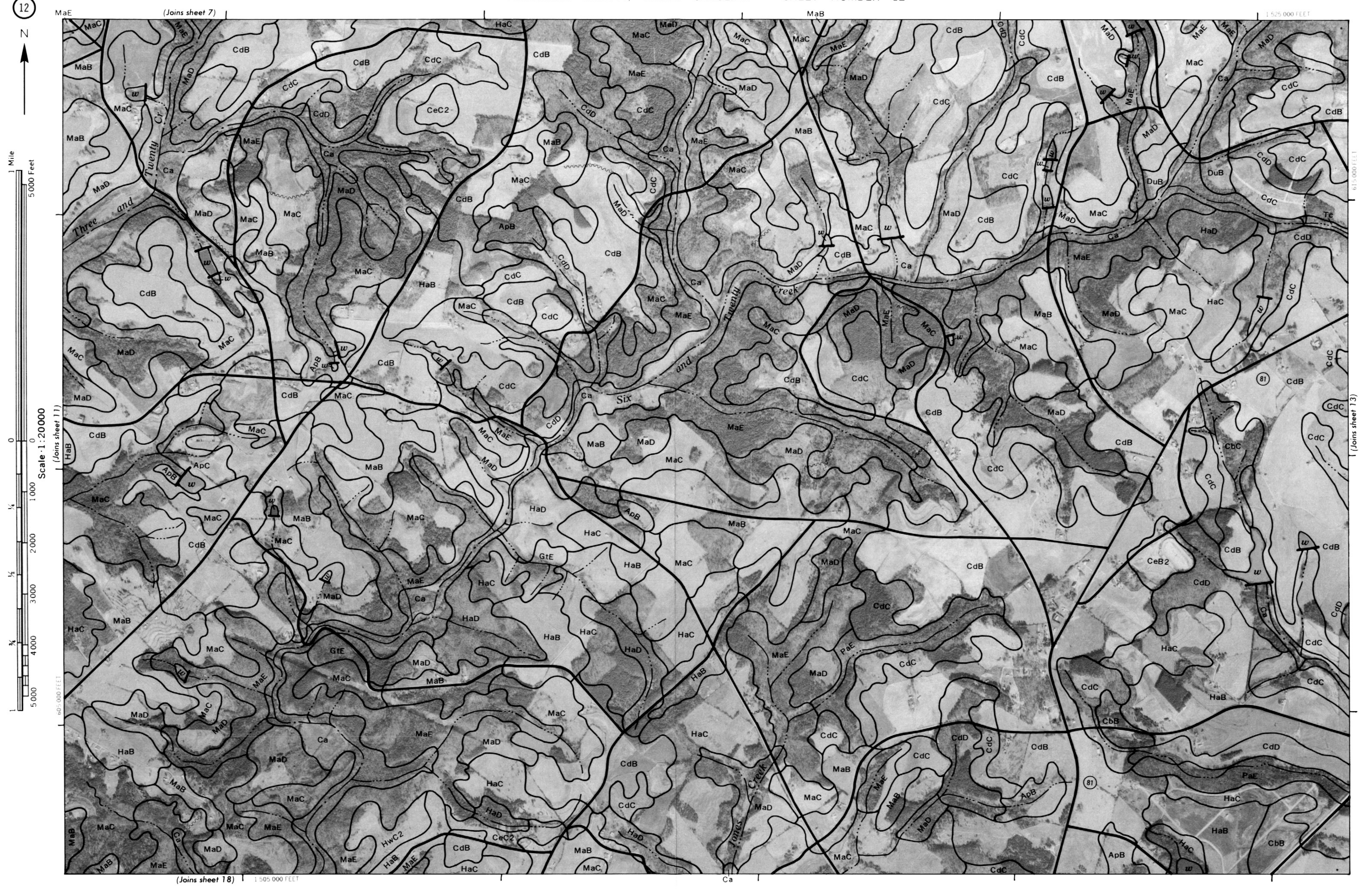
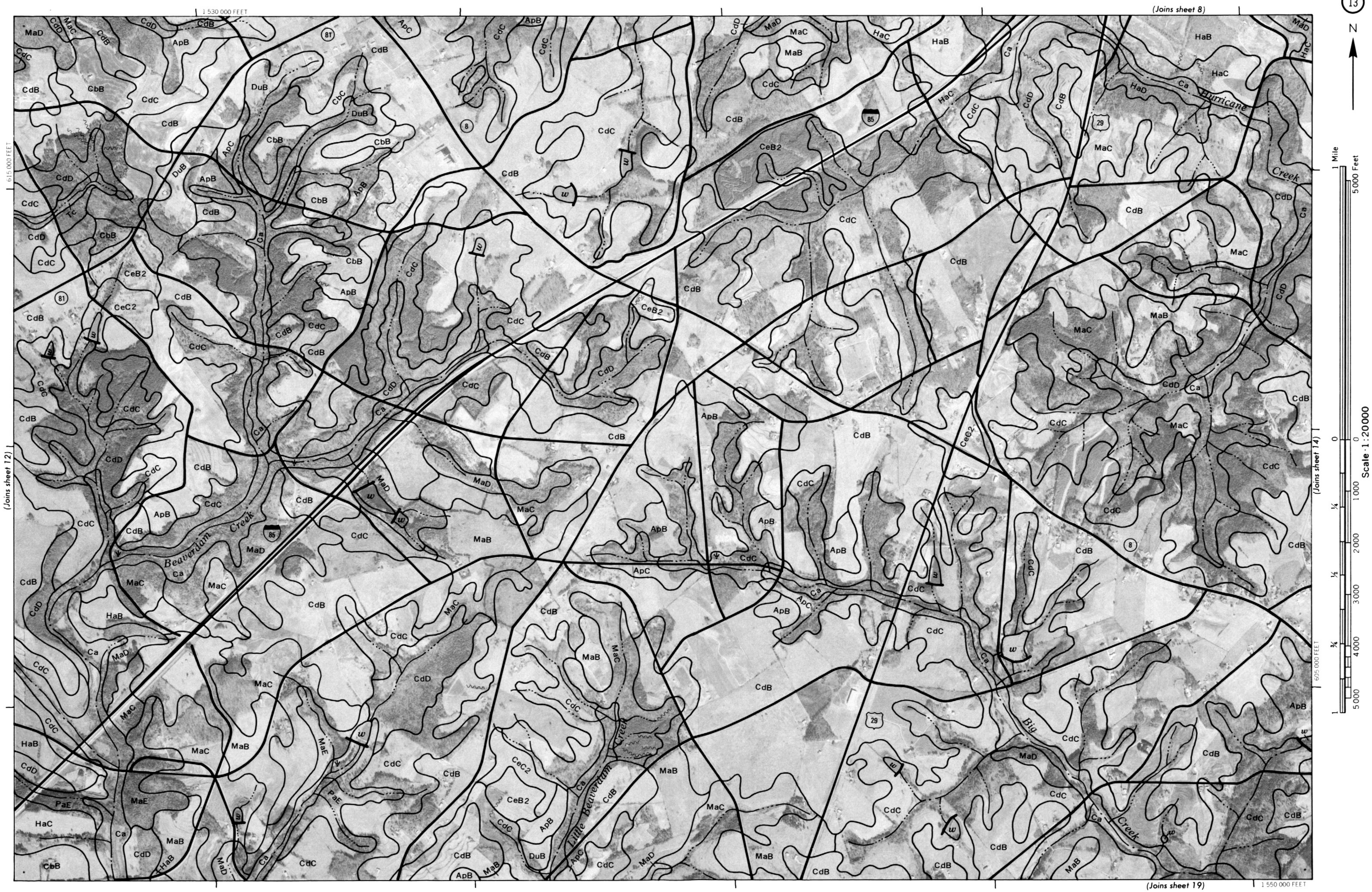


This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 12



ANDERSON COUNTY, SOUTH CAROLINA NO. 13

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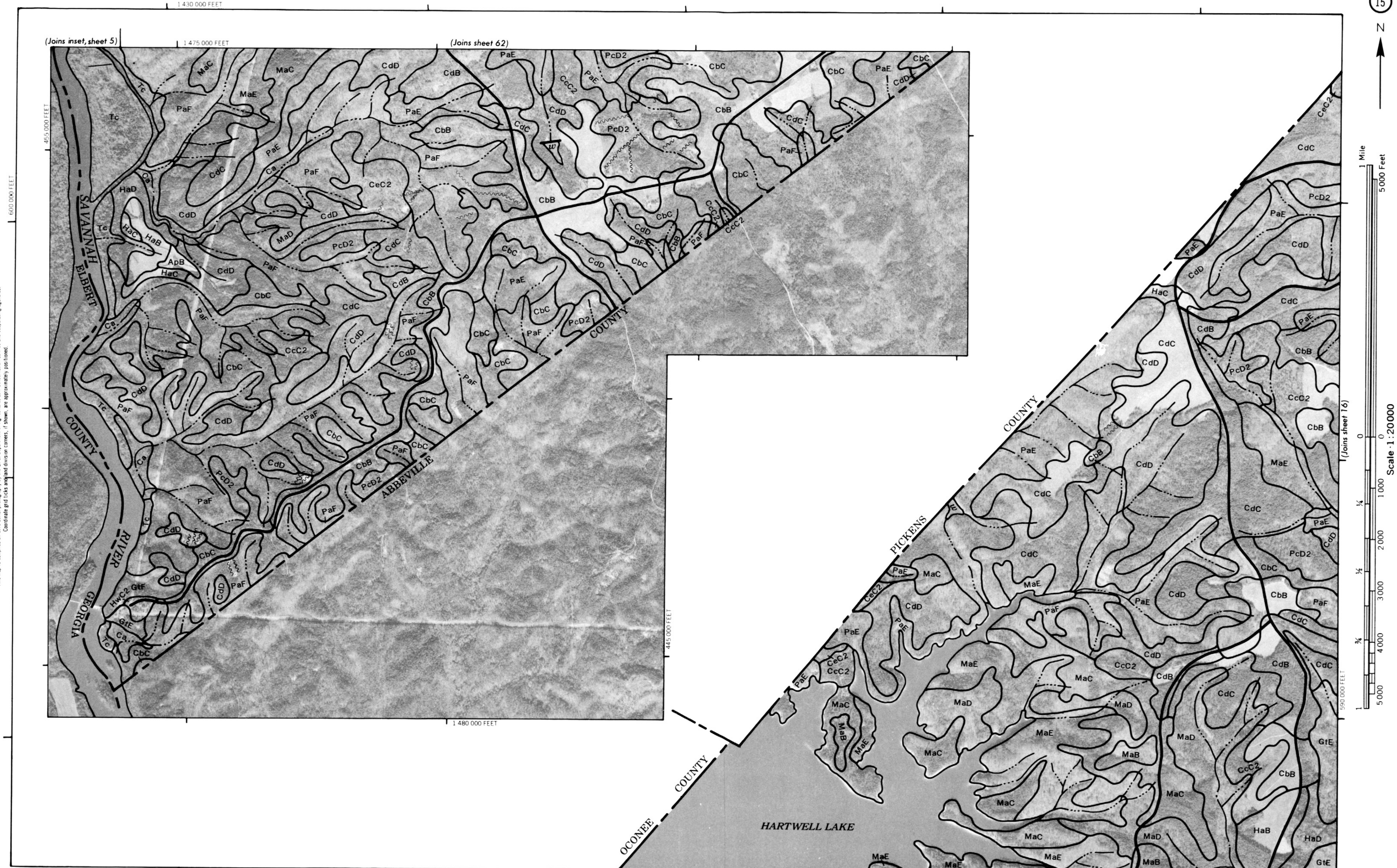
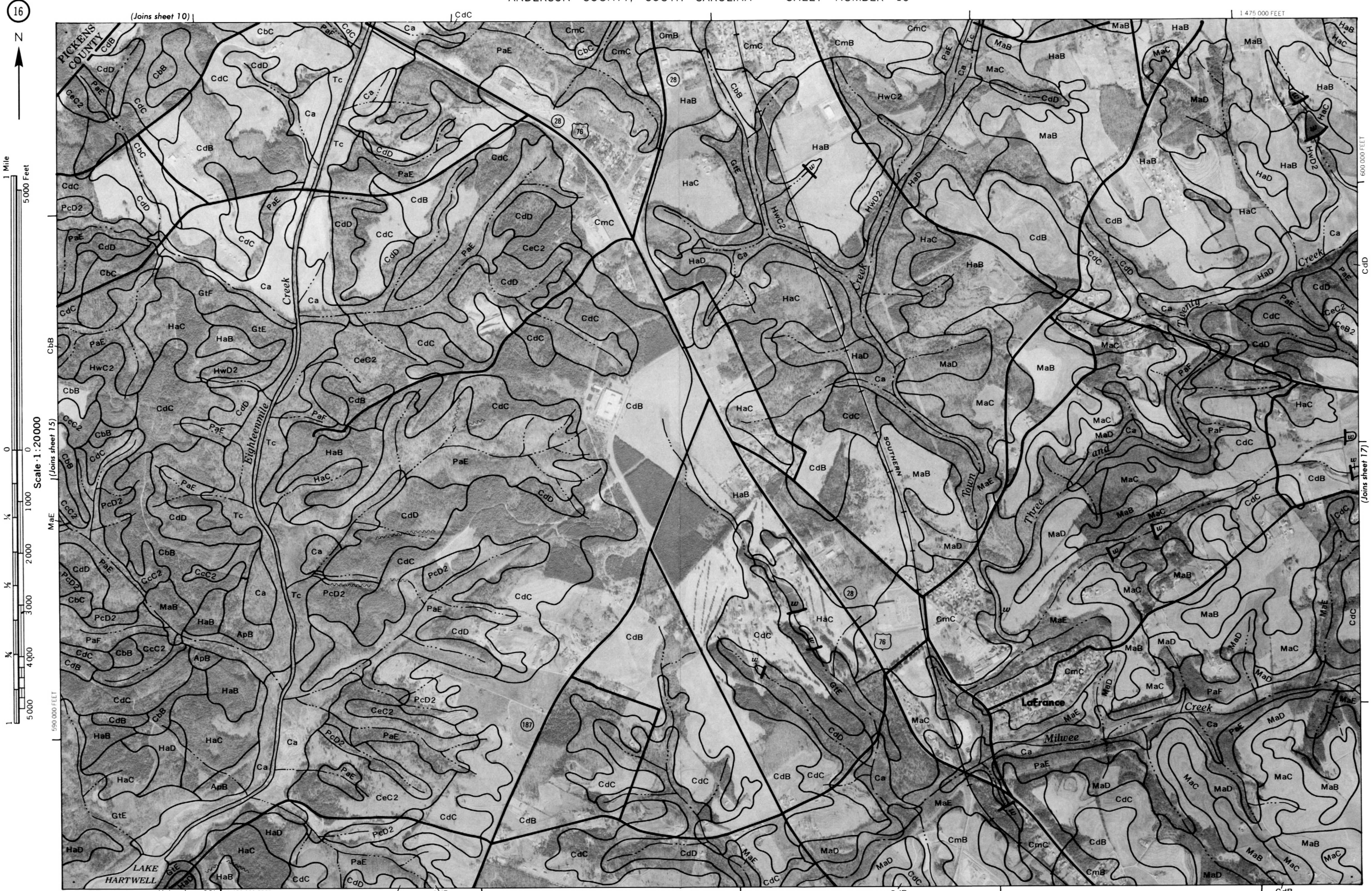
ANDERSON COUNTY, SOUTH CAROLINA NO. 14



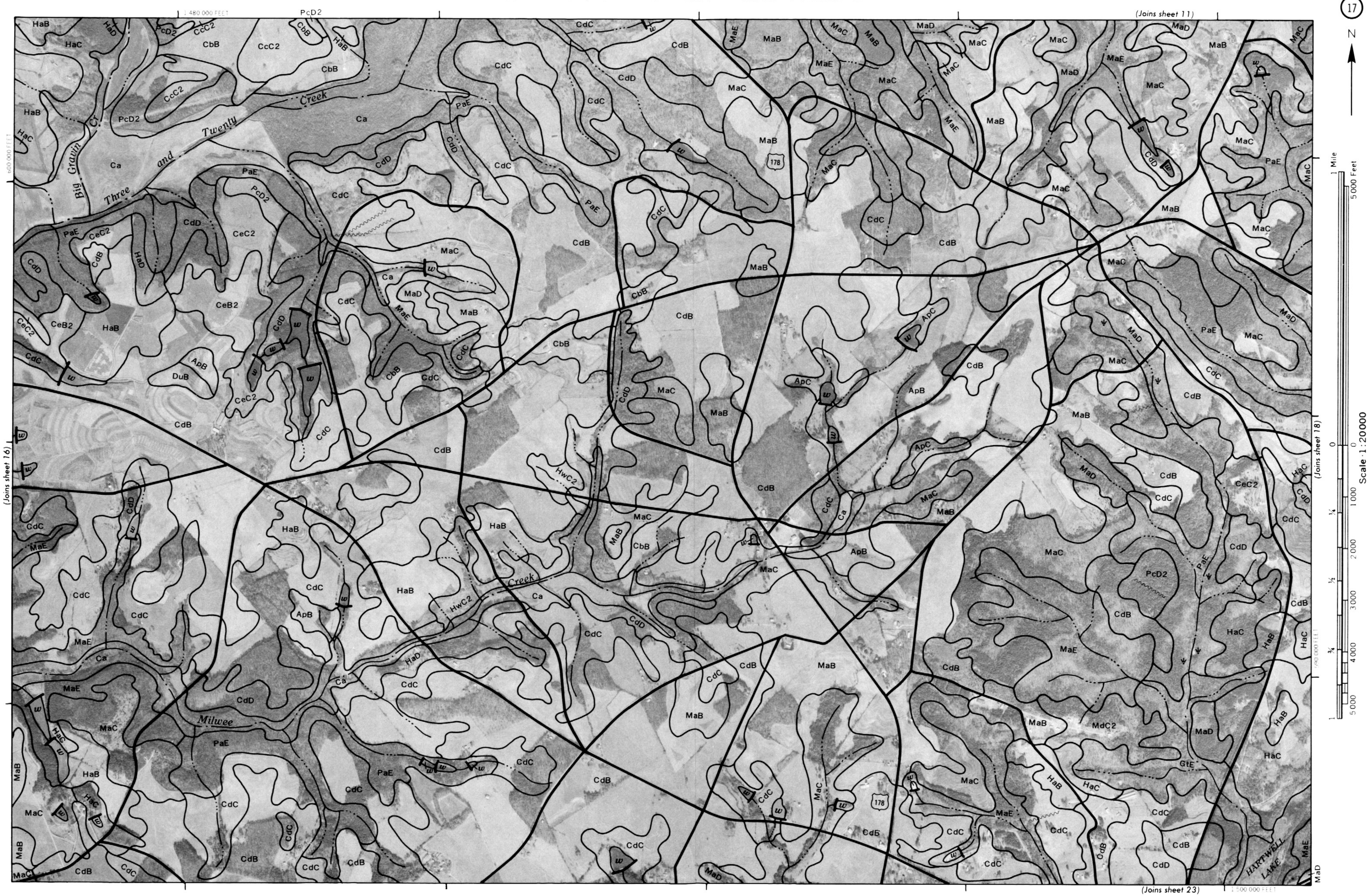
ANDERSON COUNTY, SOUTH CAROLINA NO. 15

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



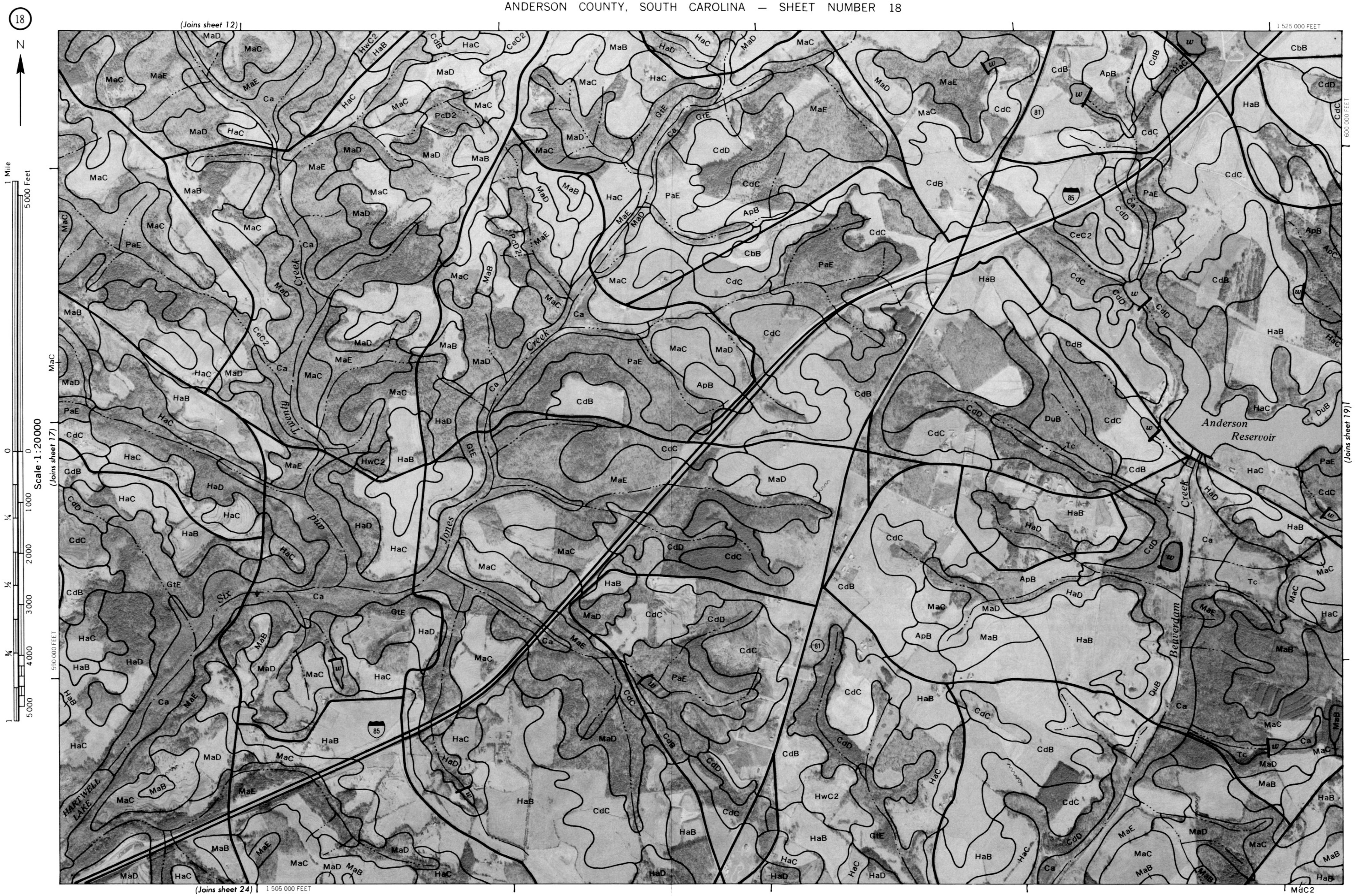
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 16



ANDERSON COUNTY, SOUTH CAROLINA NO. 17

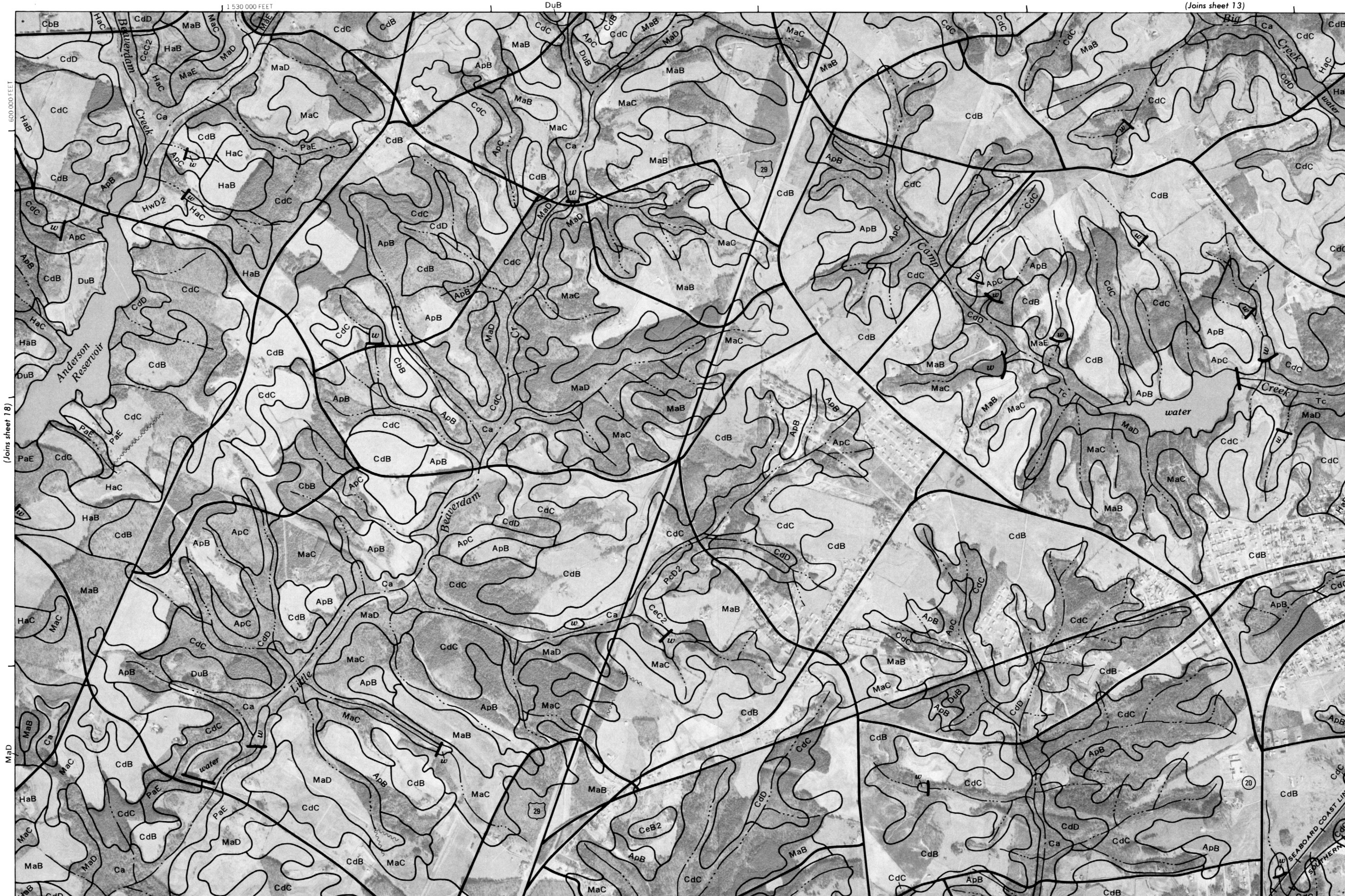
This map is compiled on 1975 aerial photography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

19

(Joins sheet 13)



(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 25)

N

Scale 1:20000

1 Mile

5000 Feet

0 ¼ ½ ¾ 1

0 1000 2000 3000 4000 5000

ANDERSON COUNTY, SOUTH CAROLINA NO. 19

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ANDERSON COUNTY, SOUTH CAROLINA NO. 20

ANDERSON COUNTY, SOUTH CAROLINA NO. 21

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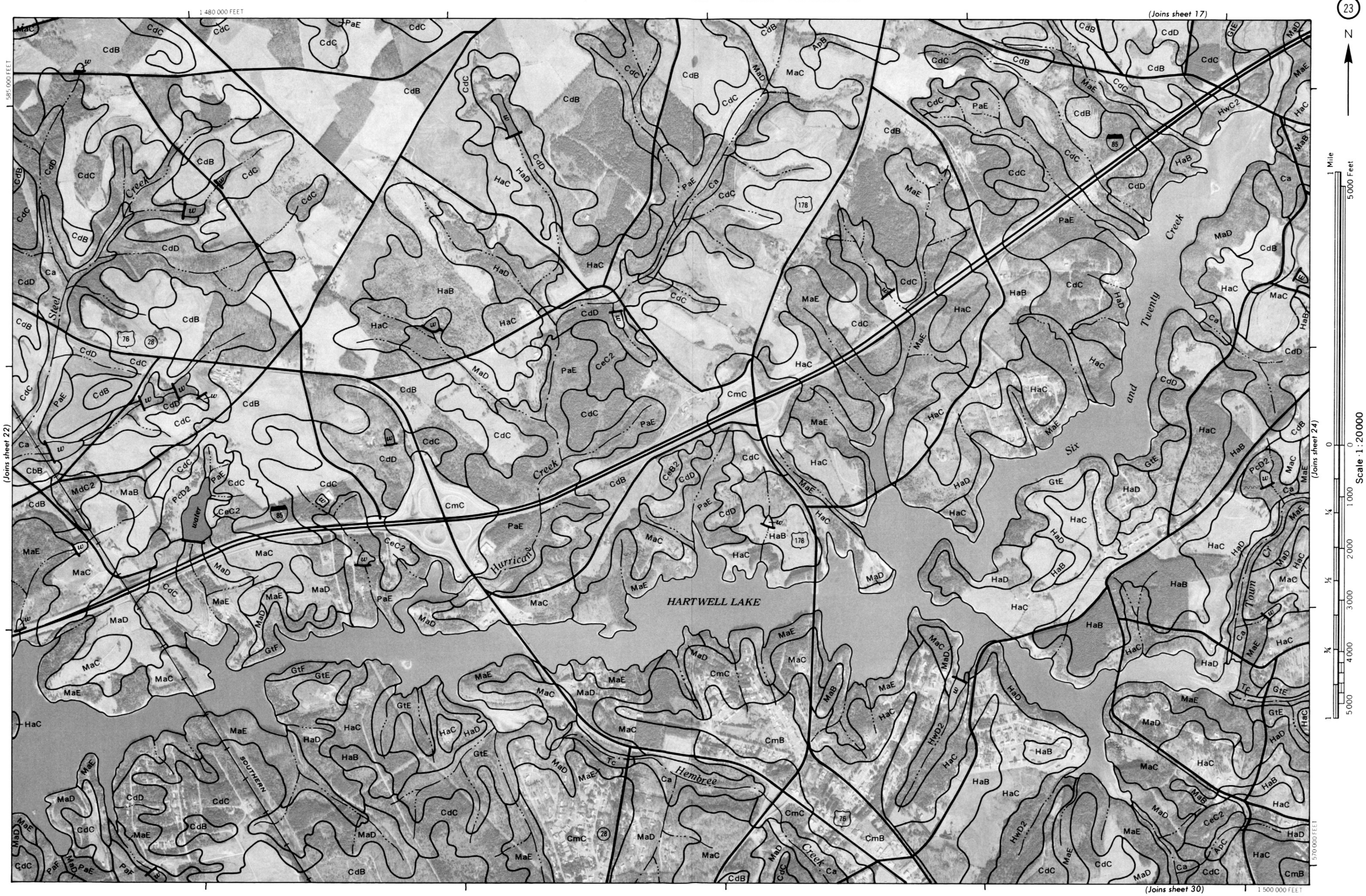
ANDERSON COUNTY, SOUTH CAROLINA NO. 22



ANDERSON COUNTY, SOUTH CAROLINA NO. 23

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

24

N

1 Mile
5000 Feet
Scale 1:20000
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

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25
N
(Joins sheet 19)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 32)
1 530 000 FEET
1 550 000 FEET
585 000 FEET
570 000 FEET
Cheddar
Beaverdam Creek
Little Beaverdam Creek
Creek
Watermelon Creek
Rock Creek
Browns Creek
SEABOARD COAST LINE
SOUTHERN
29
20
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1
ANDERSON COUNTY, SOUTH CAROLINA NO. 25
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.
ApB
ApC
Ca
CbB
CbC
CdB
CdC
CdD
CeB2
CeC2
HaB
HaC
HaD
MaB
MaC
MaD
MaE
PaE
PcD2
w

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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ANDERSON COUNTY, SOUTH CAROLINA NO. 26

ANDERSON COUNTY, SOUTH CAROLINA NO. 27

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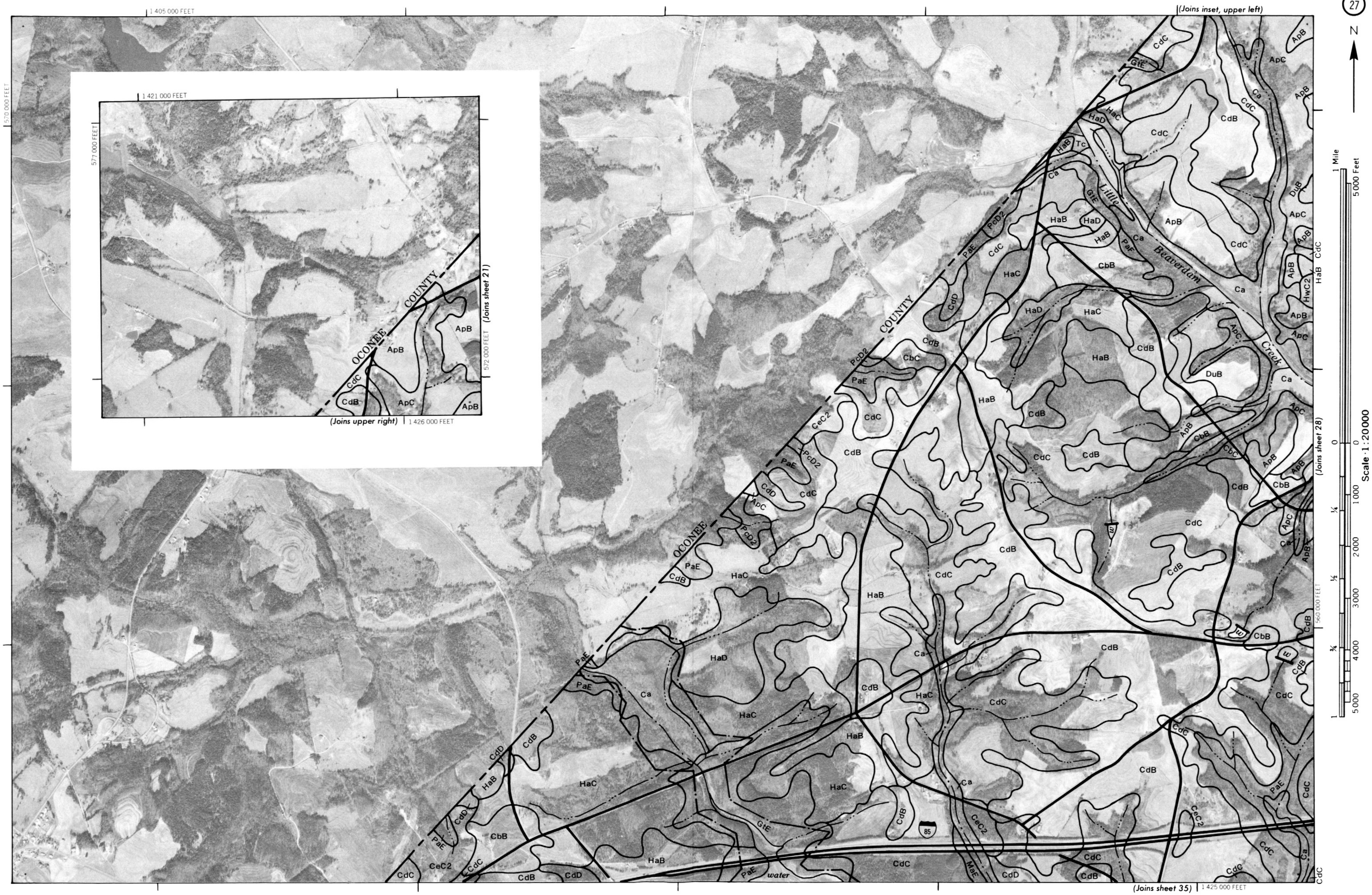

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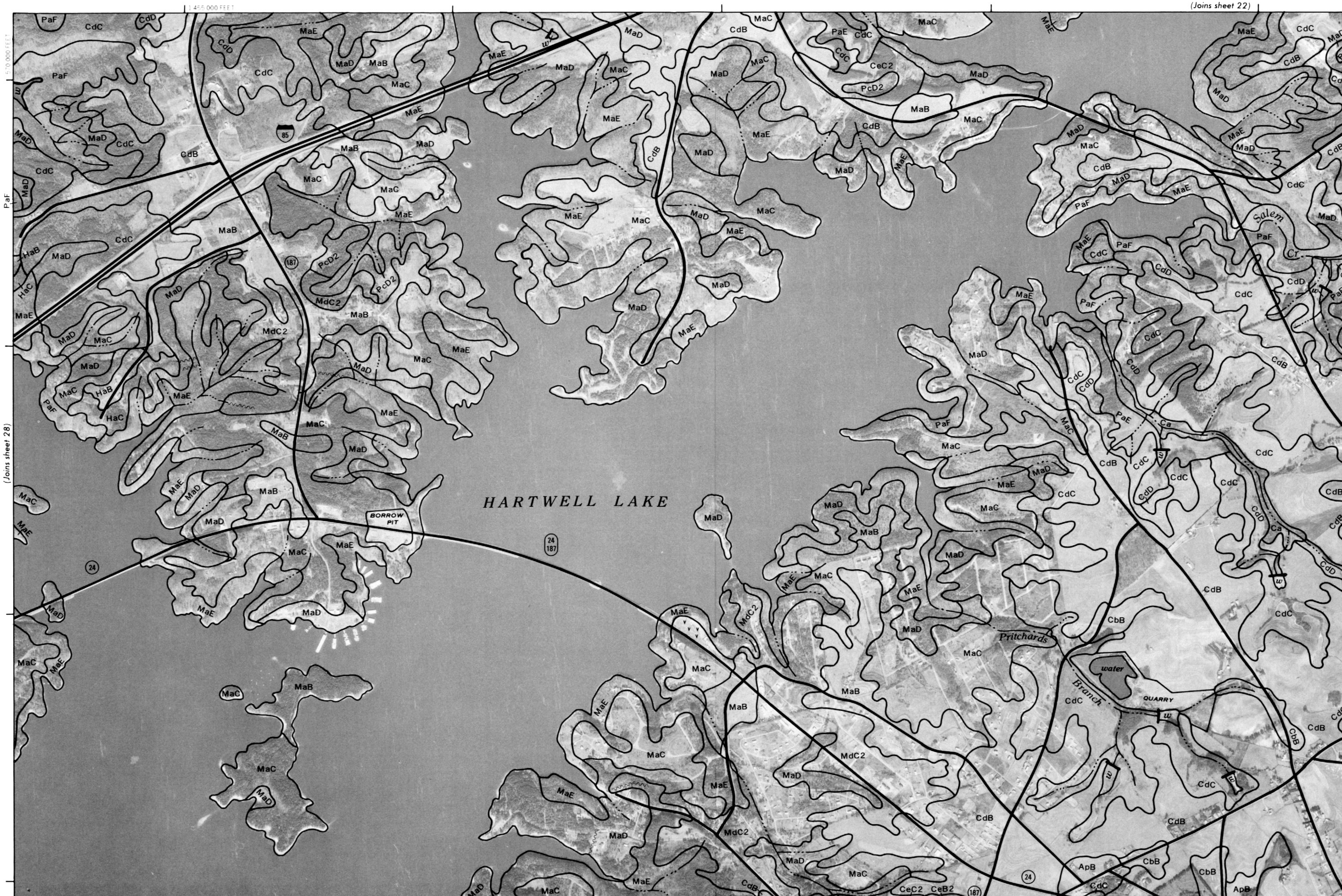

Scale 1:20000
1 Mile
5000 Feet

ANDERSON COUNTY, SOUTH CAROLINA NO. 29

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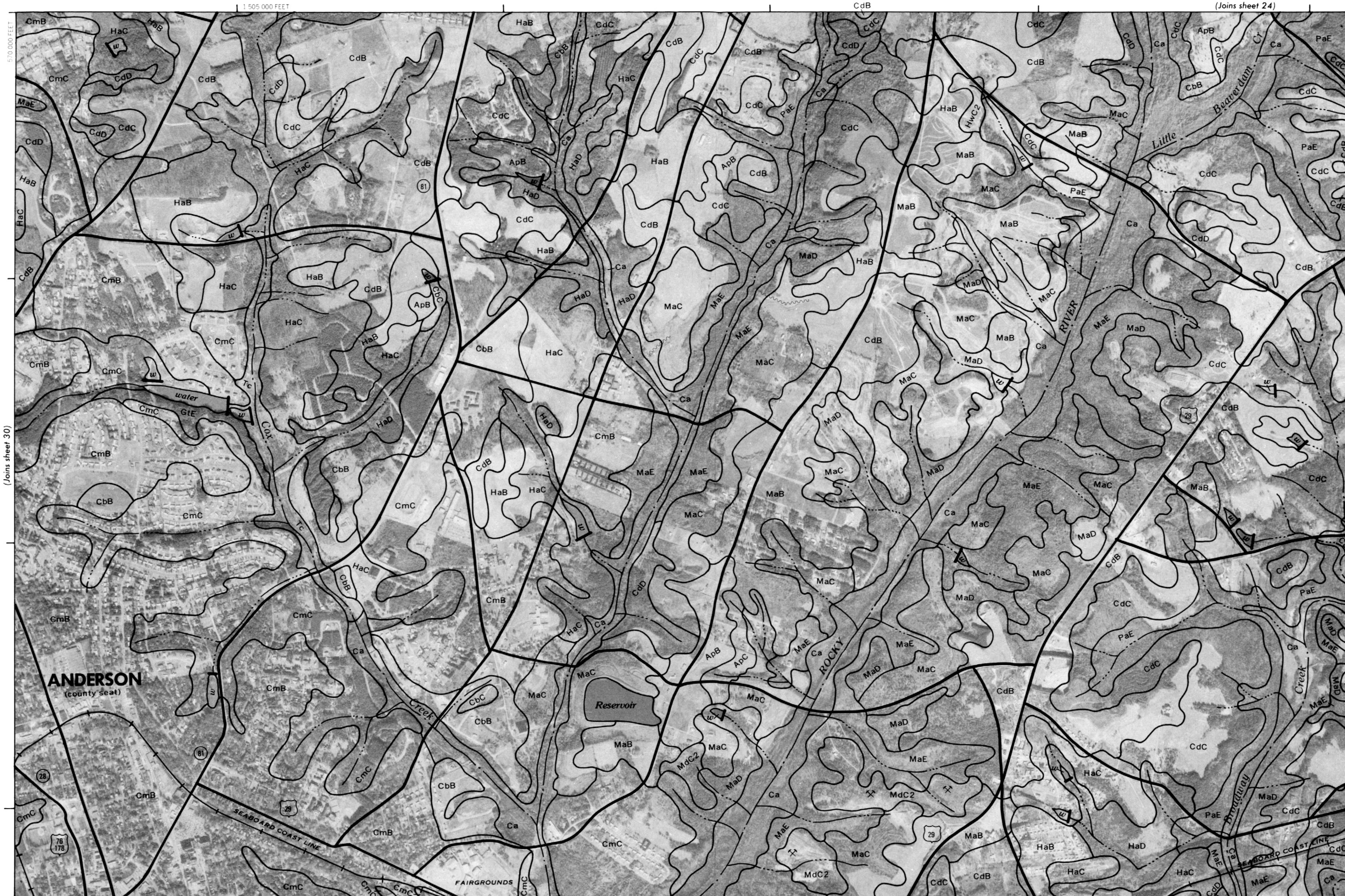
ANDERSON COUNTY, SOUTH CAROLINA NO. 30

31



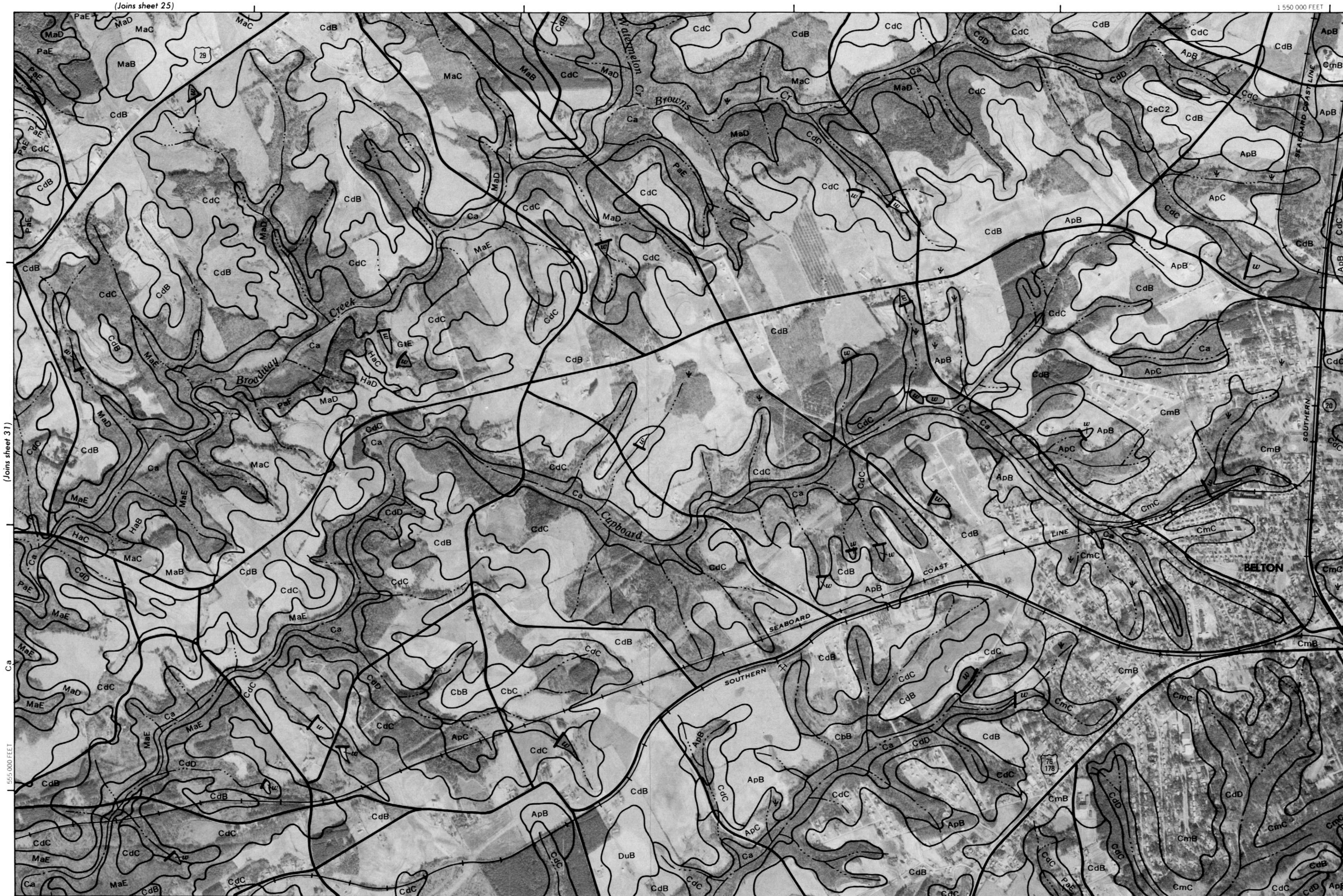
1 Mile
5 000 Feet
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1
Scale 1:20000

ANDERSON COUNTY, SOUTH CAROLINA NO. 31

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

32

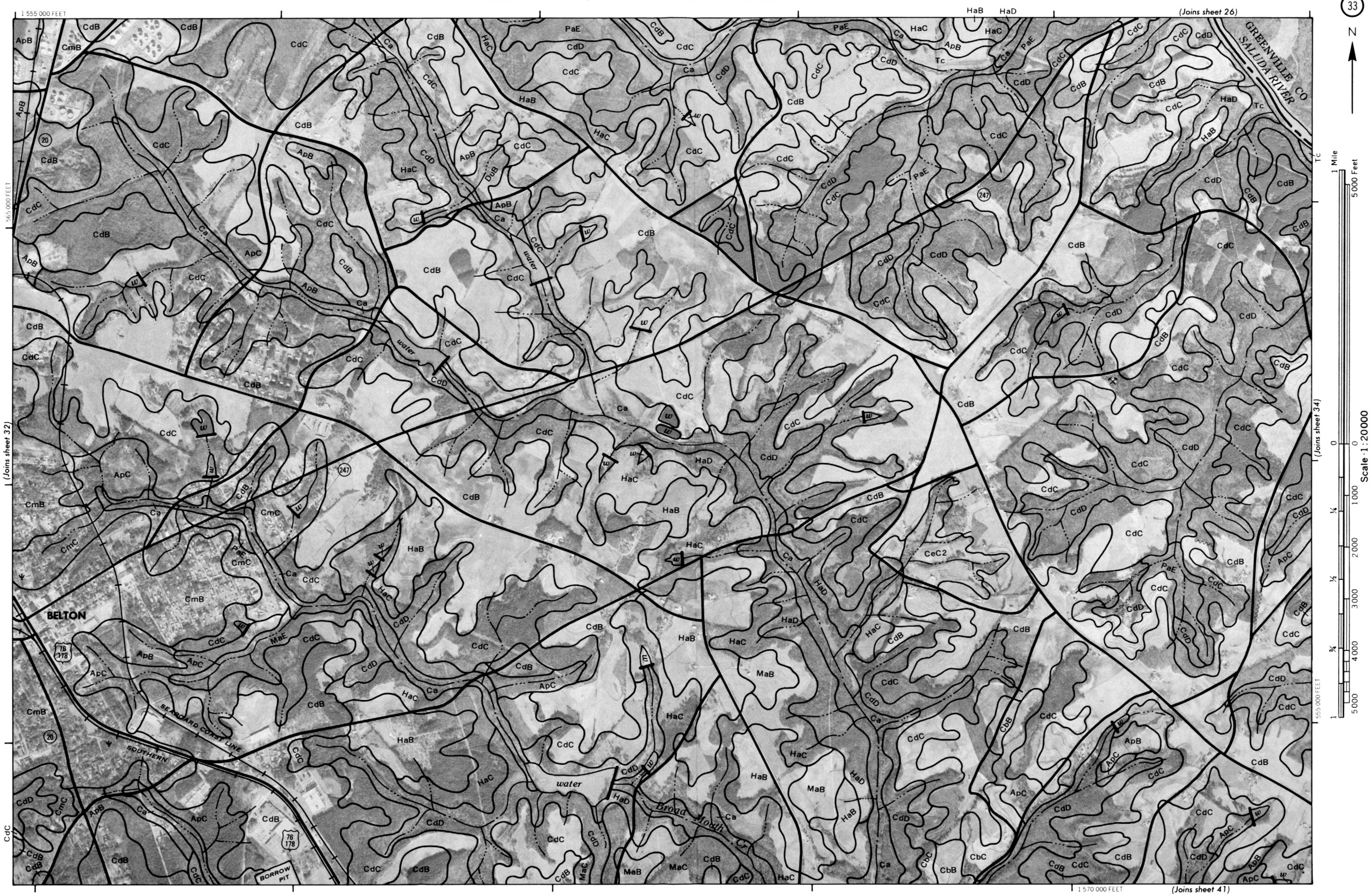
N



1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 32



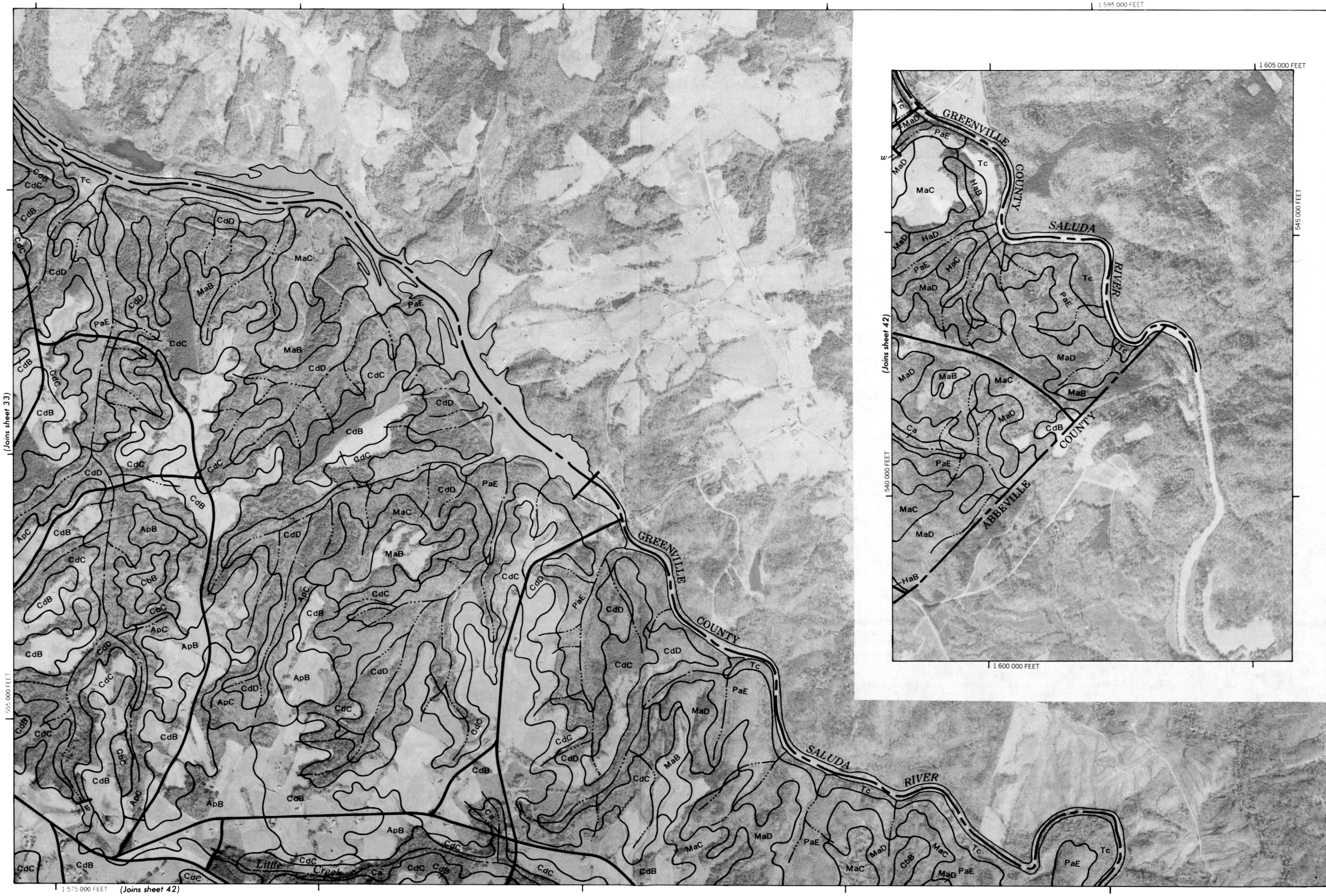
ANDERSON COUNTY, SOUTH CAROLINA NO. 33

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:20000

1 Mile
0 ¼ ½ ¾ 1
5000 Feet
0 1000 2000 3000 4000 5000



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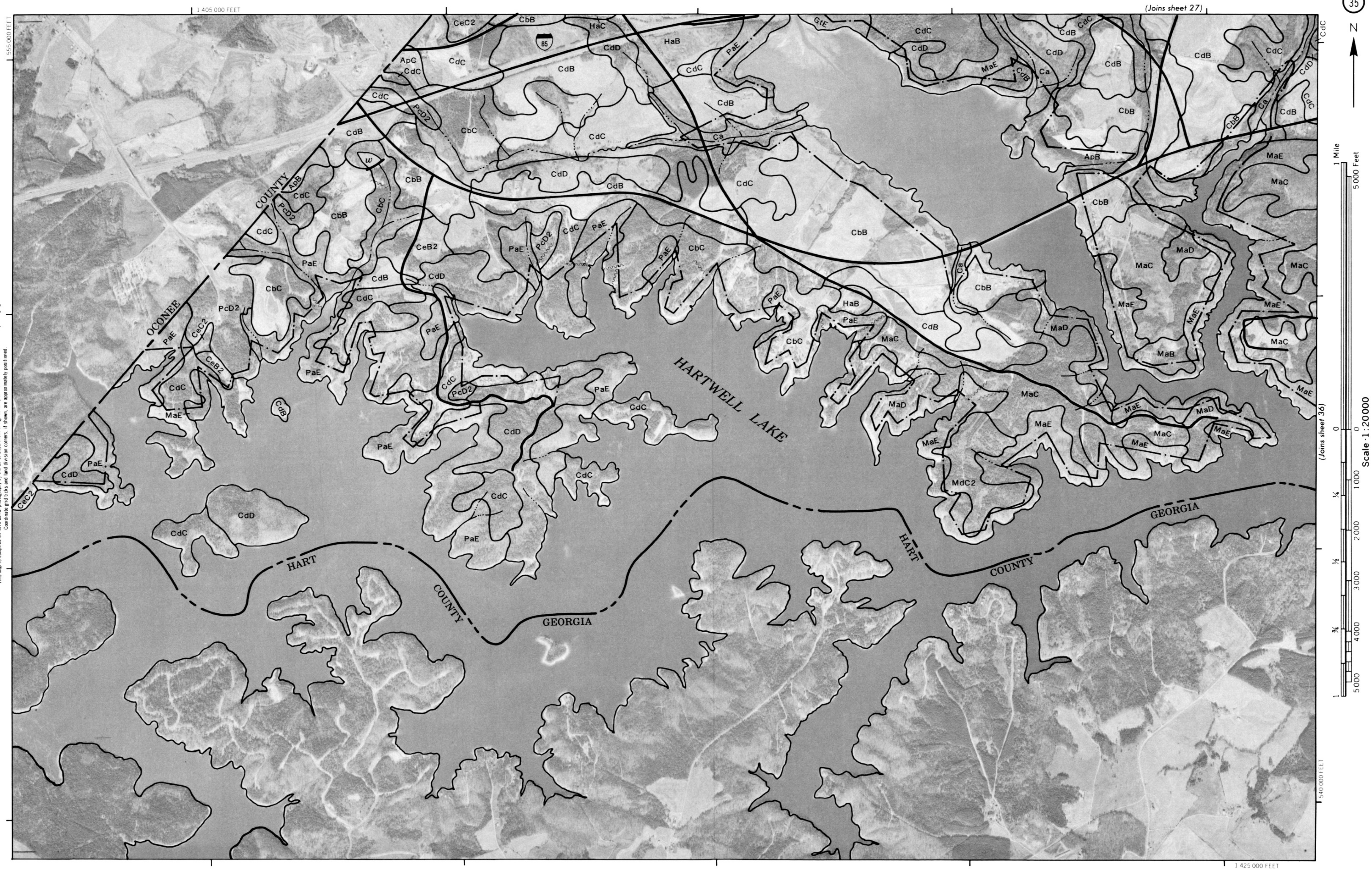
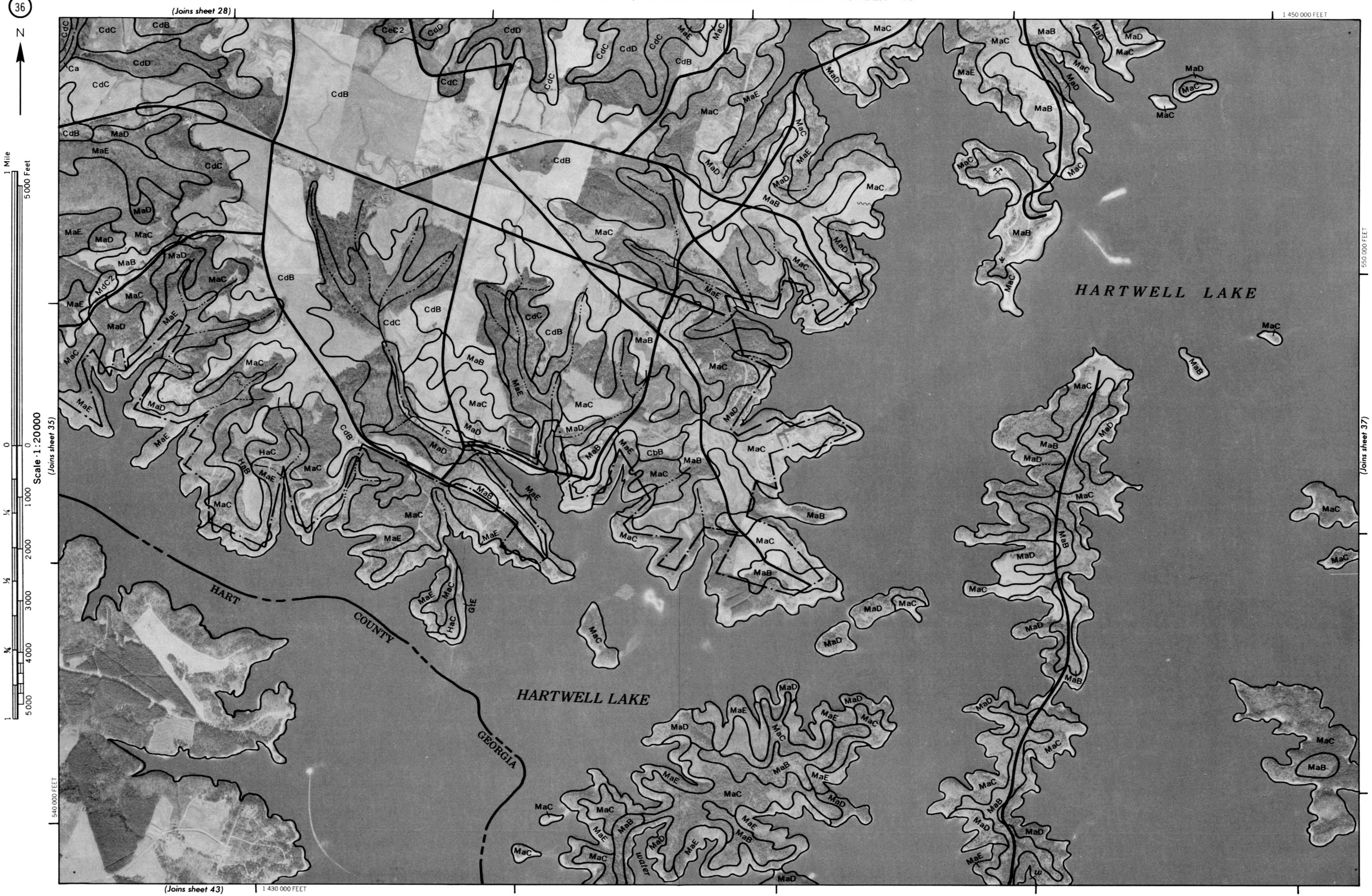
ANDERSON COUNTY, SOUTH CAROLINA NO. 34



ANDERSON COUNTY, SOUTH CAROLINA NO. 35

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA — SHEET NUMBER 36



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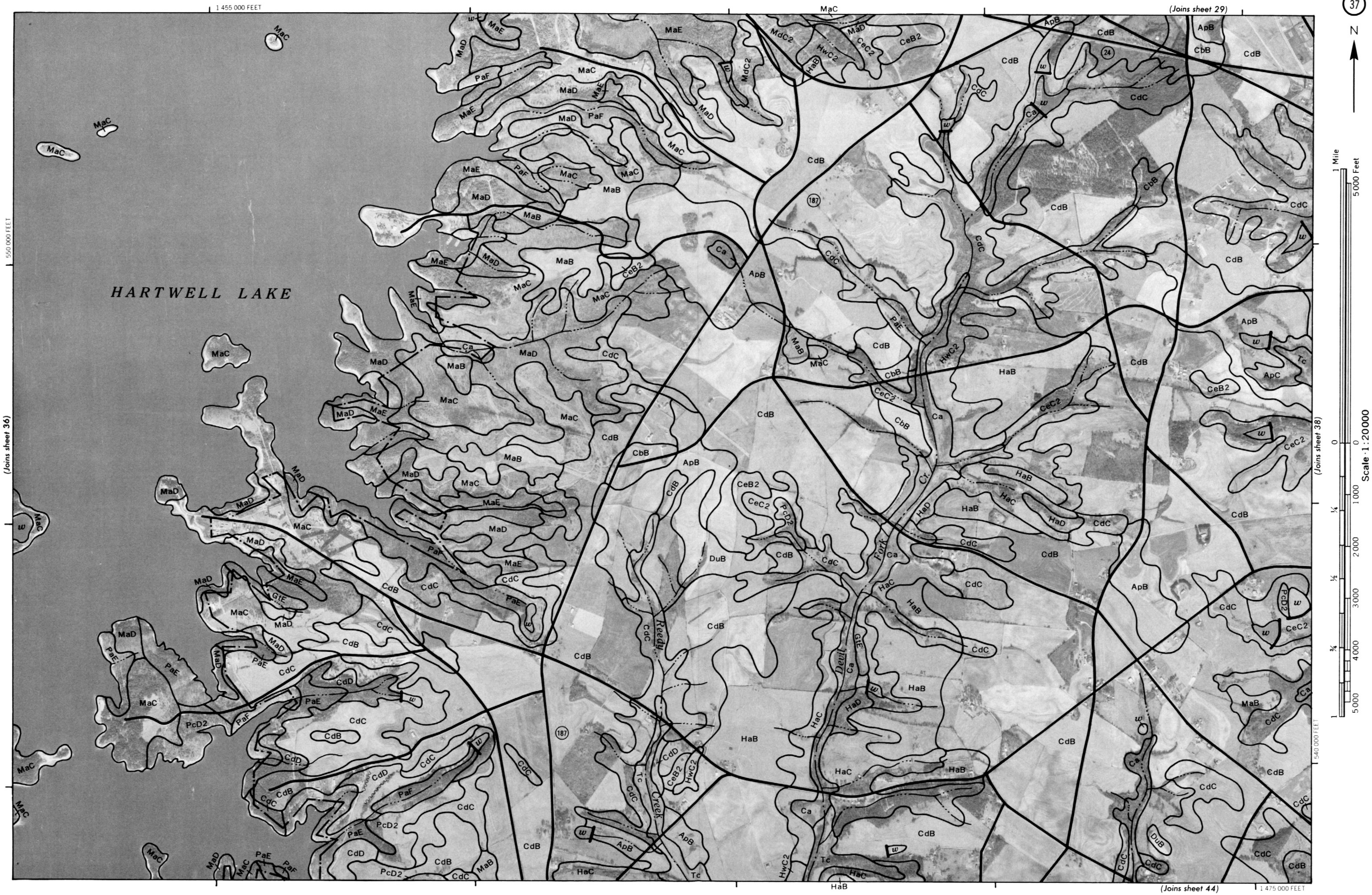
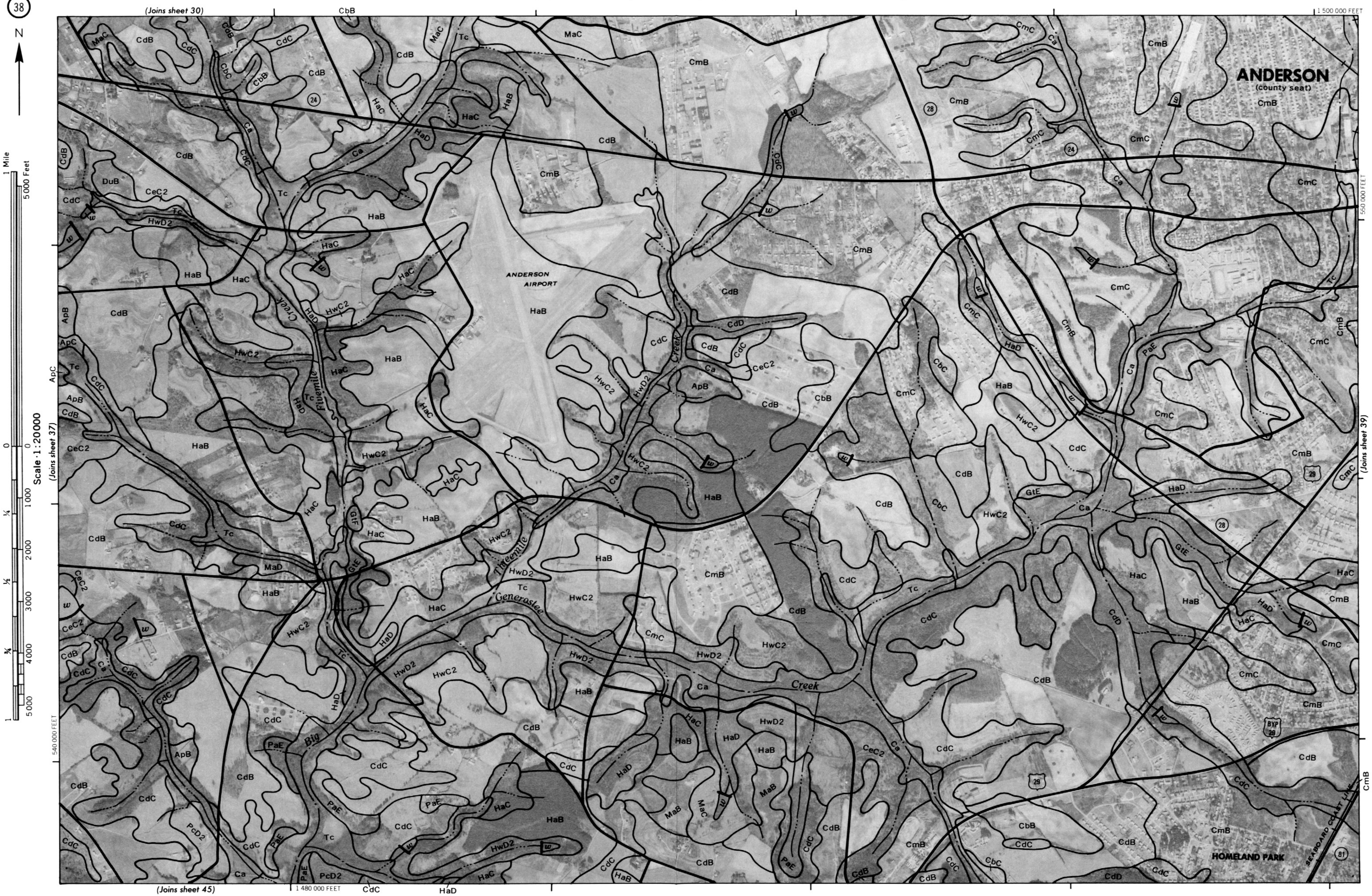
ANDERSON COUNTY, SOUTH CAROLINA NO. 36



ANDERSON COUNTY, SOUTH CAROLINA NO. 37

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



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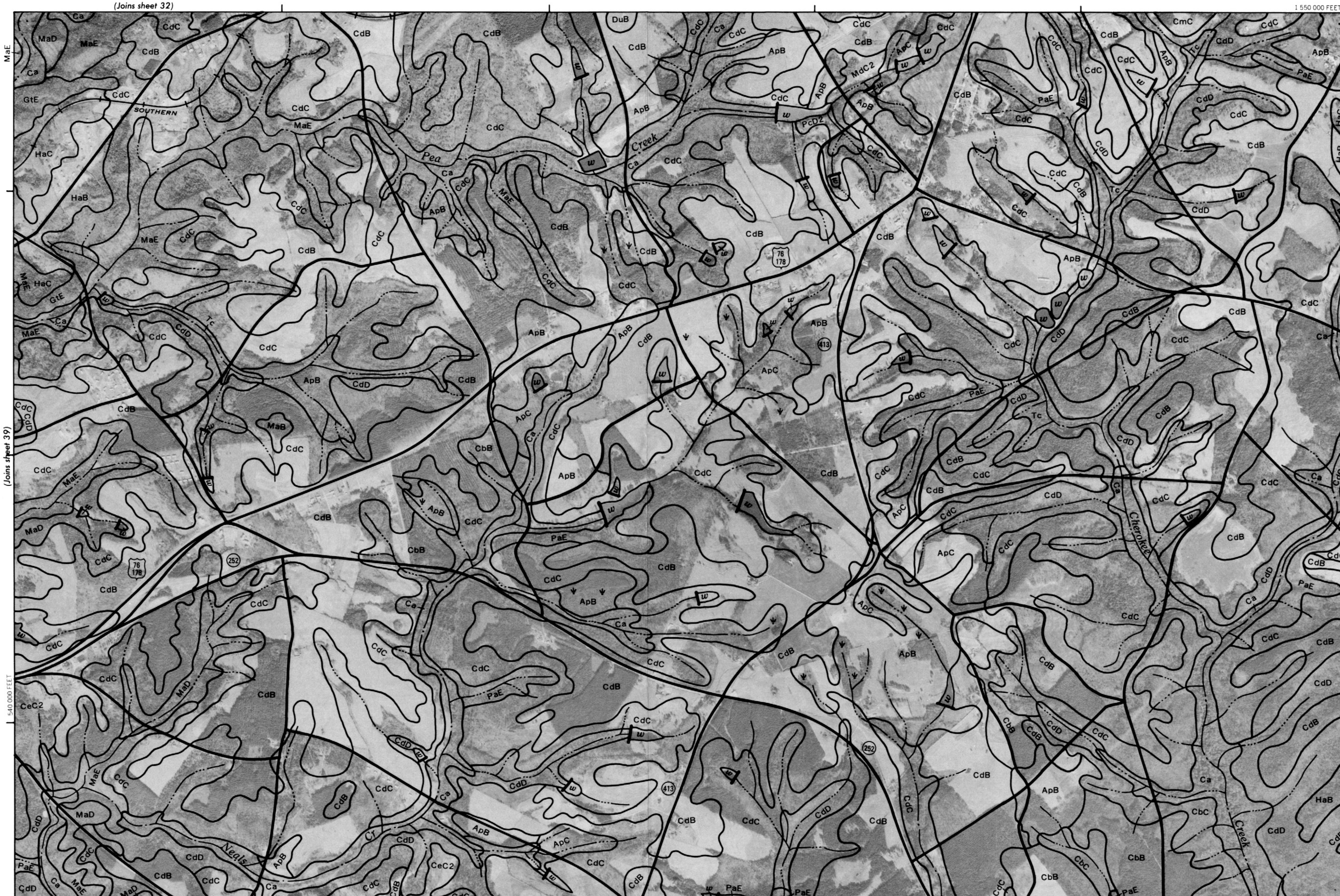
ANDERSON COUNTY, SOUTH CAROLINA NO. 38

ANDERSON COUNTY, SOUTH CAROLINA NO. 39

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

40

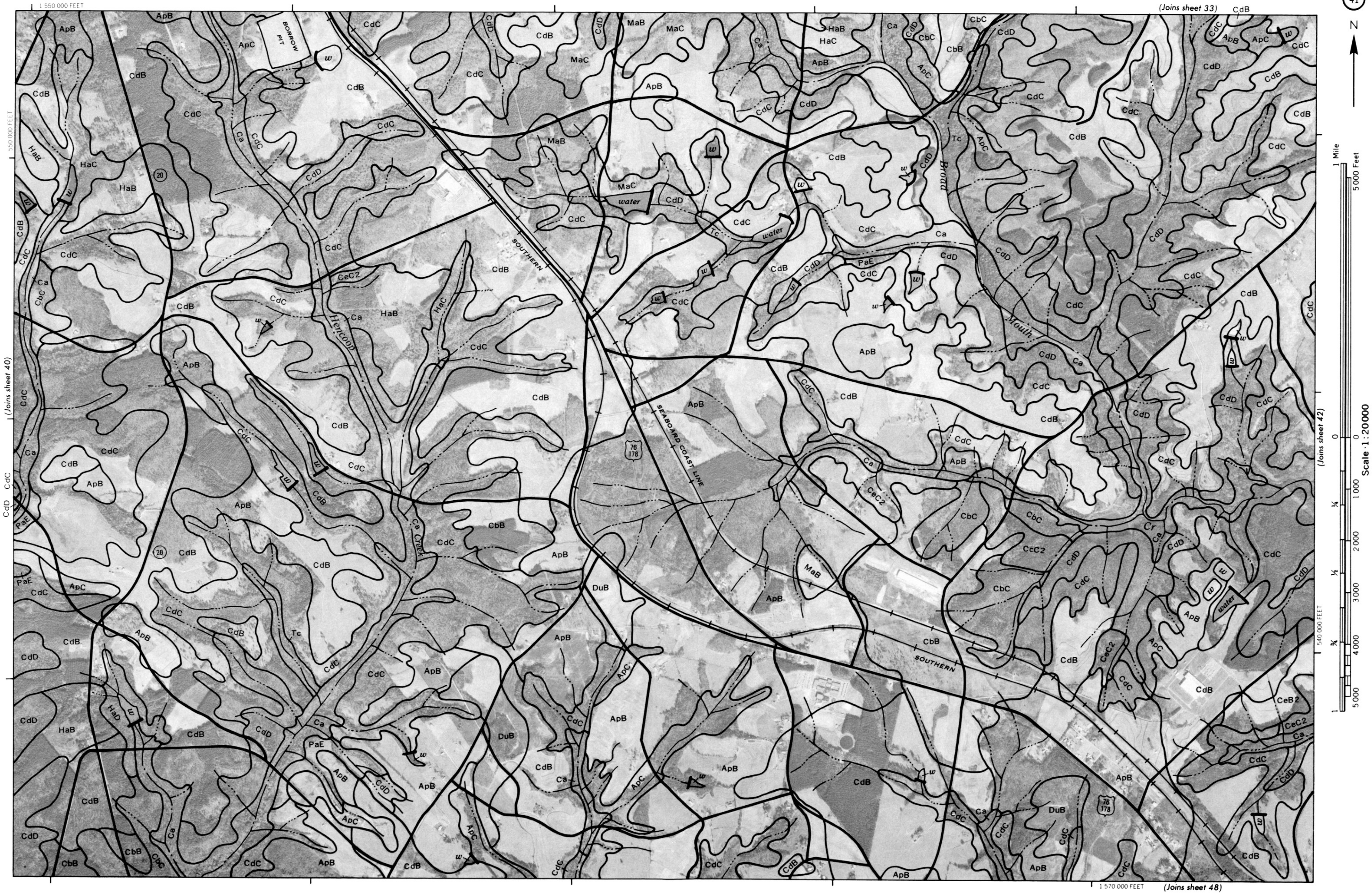
N



1 Mile
5000 Feet
Scale 1:20000
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

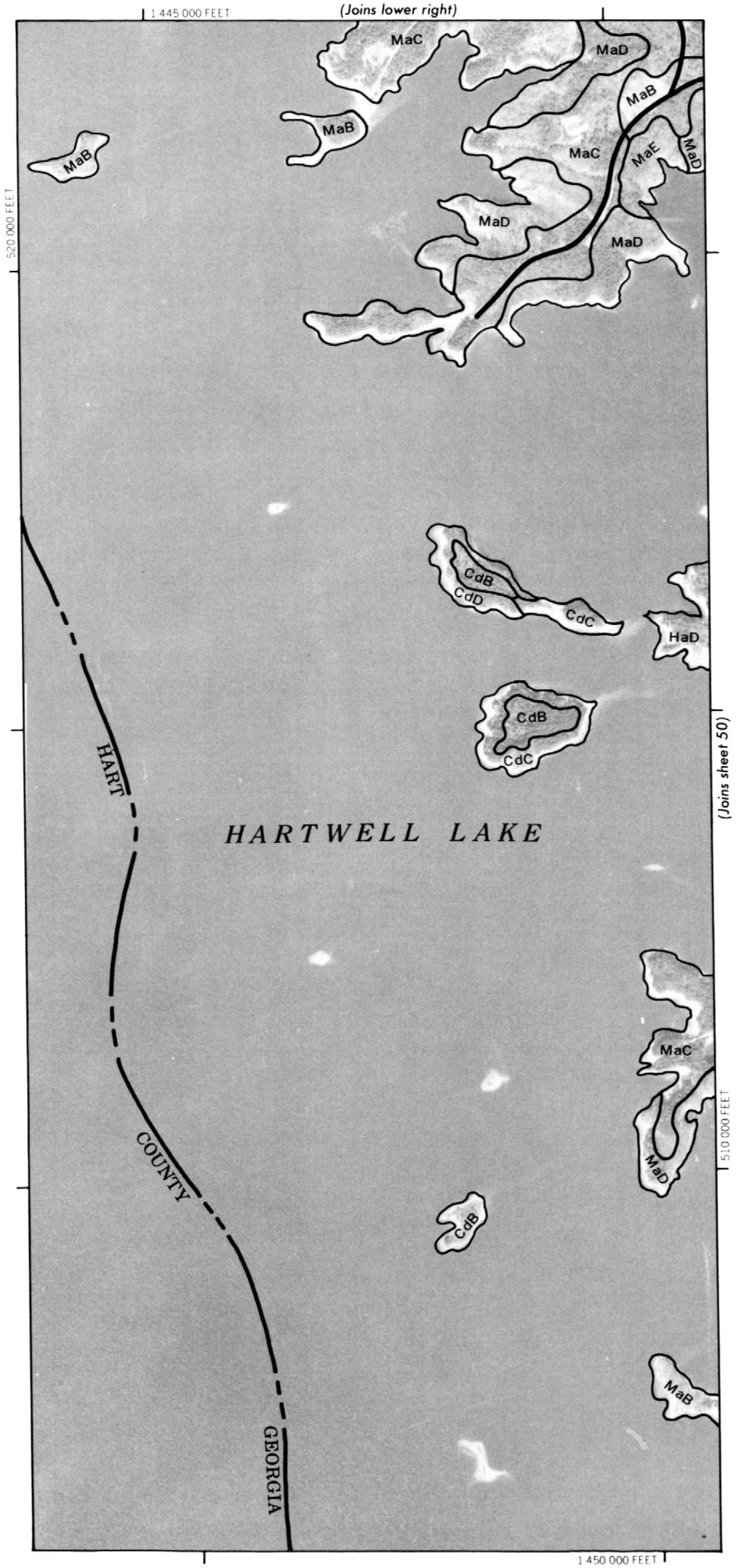
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

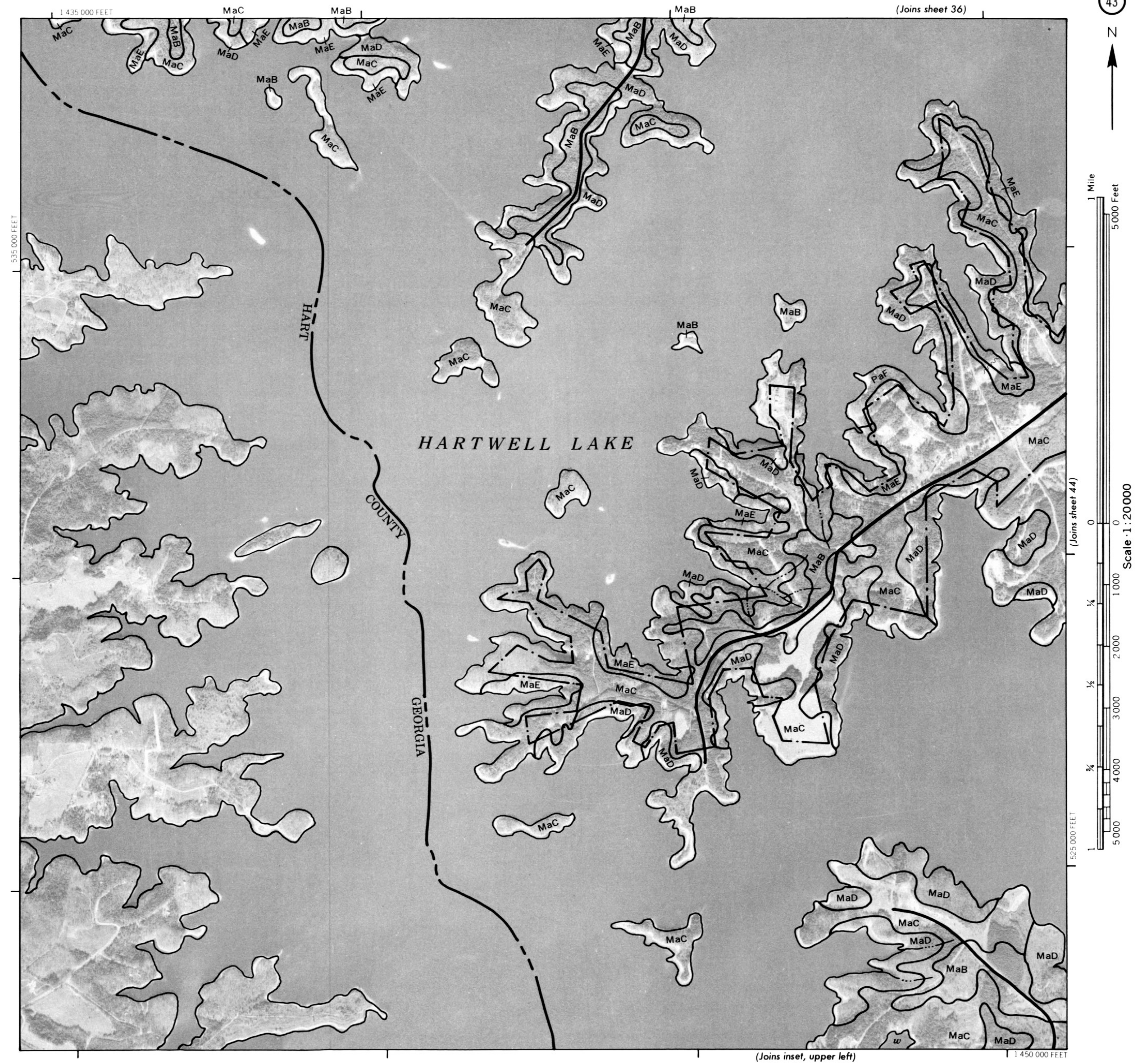
ANDERSON COUNTY, SOUTH CAROLINA NO. 40



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.





ANDERSON COUNTY, SOUTH CAROLINA NO. 43

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

44

N

1 Mile
5000 Feet
Scale 1:20000

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

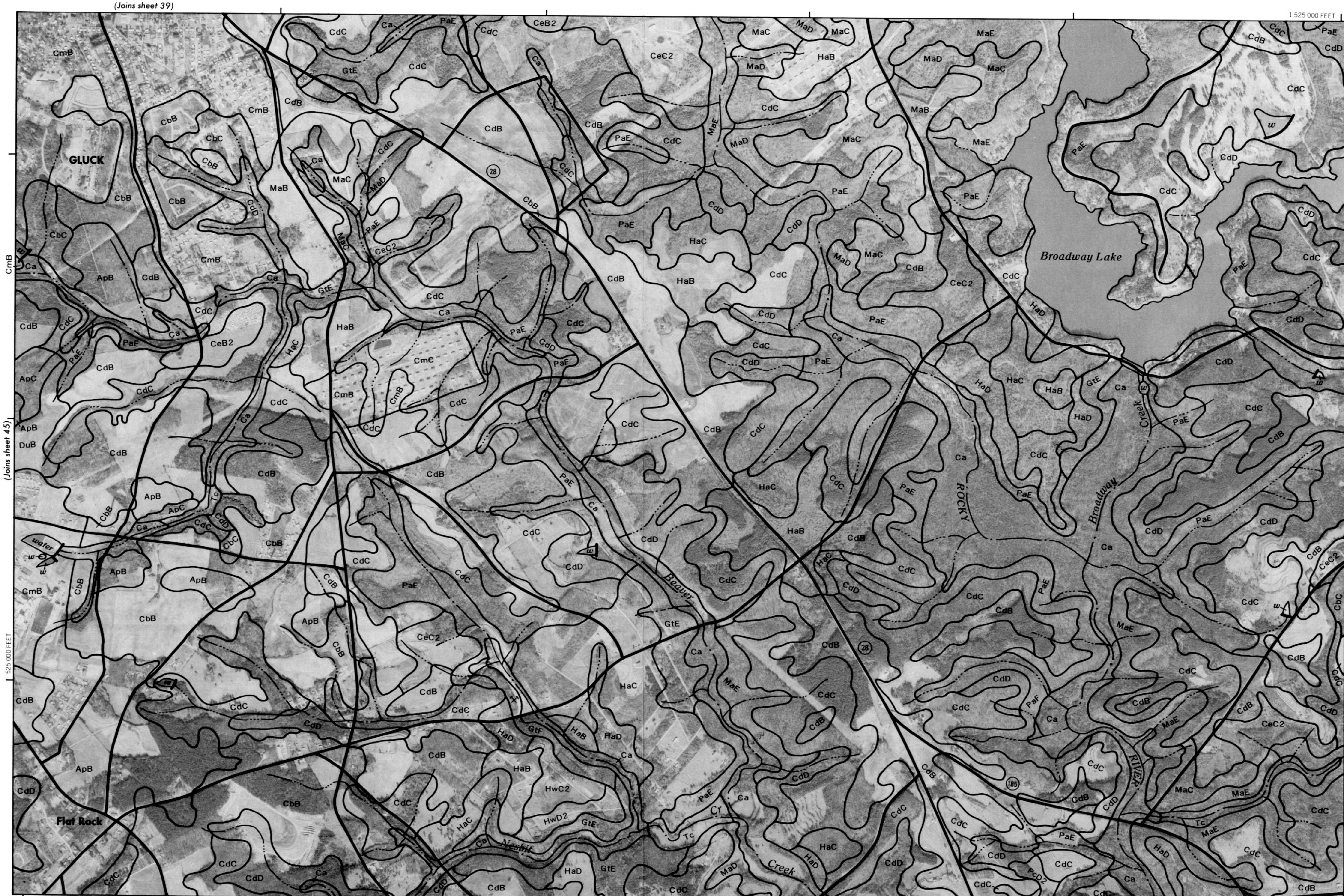
ANDERSON COUNTY, SOUTH CAROLINA NO. 44

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

46

N

(Joins sheet 39)



(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 52)

1 Mile

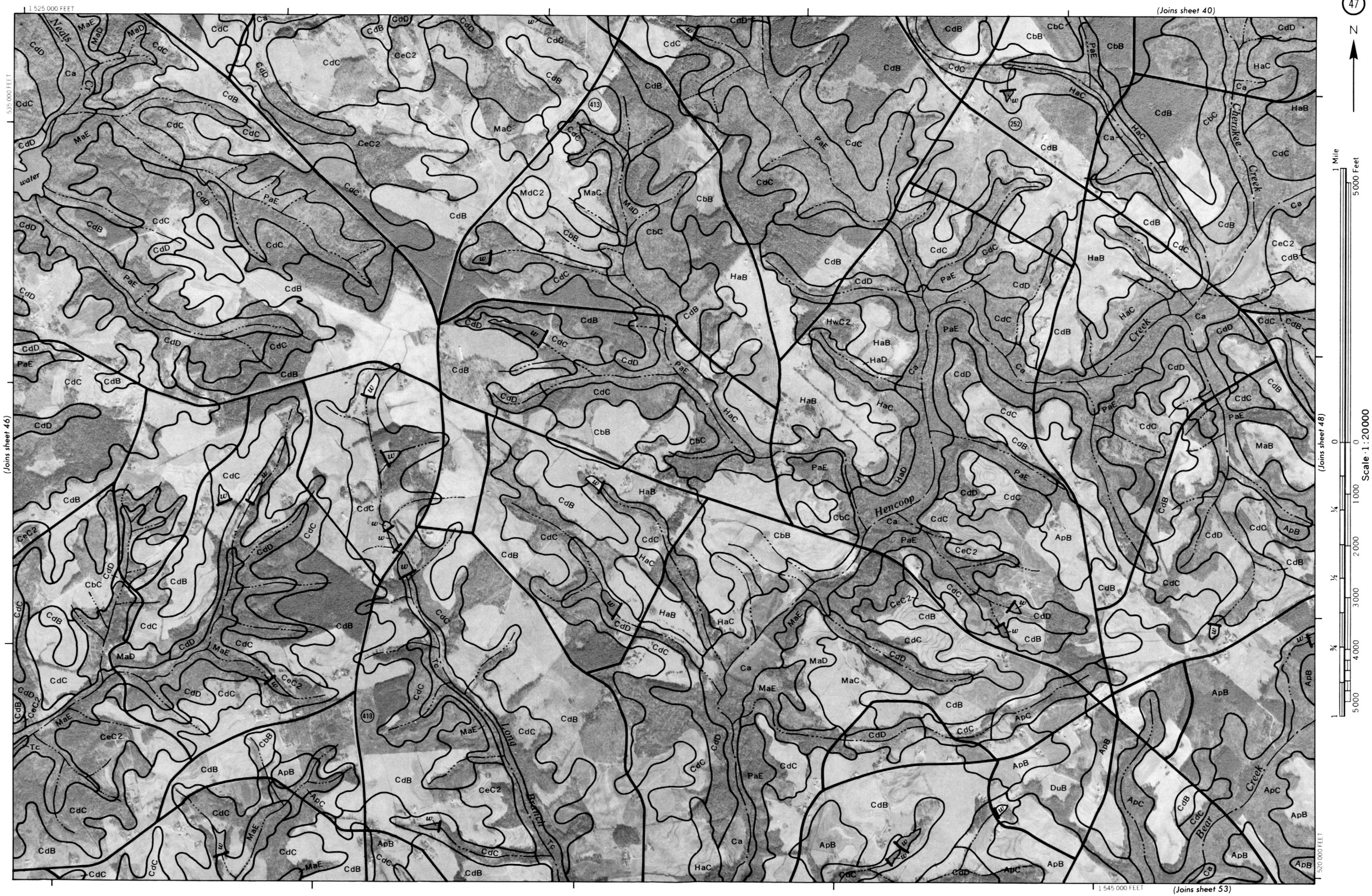
5000 Feet

Scale 1:20000

0 1000 2000 3000 4000 5000

0 ¼ ½ ¾ 1

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



ANDERSON COUNTY, SOUTH CAROLINA NO. 47

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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ANDERSON COUNTY, SOUTH CAROLINA NO. 48

49

N

Scale 1:20000

1 Mile | 0 | ¼ | ½ | ¾ | 1

5000 Feet | 0 | 1000 | 2000 | 3000 | 4000 | 5000

ANDERSON COUNTY, SOUTH CAROLINA NO. 49

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

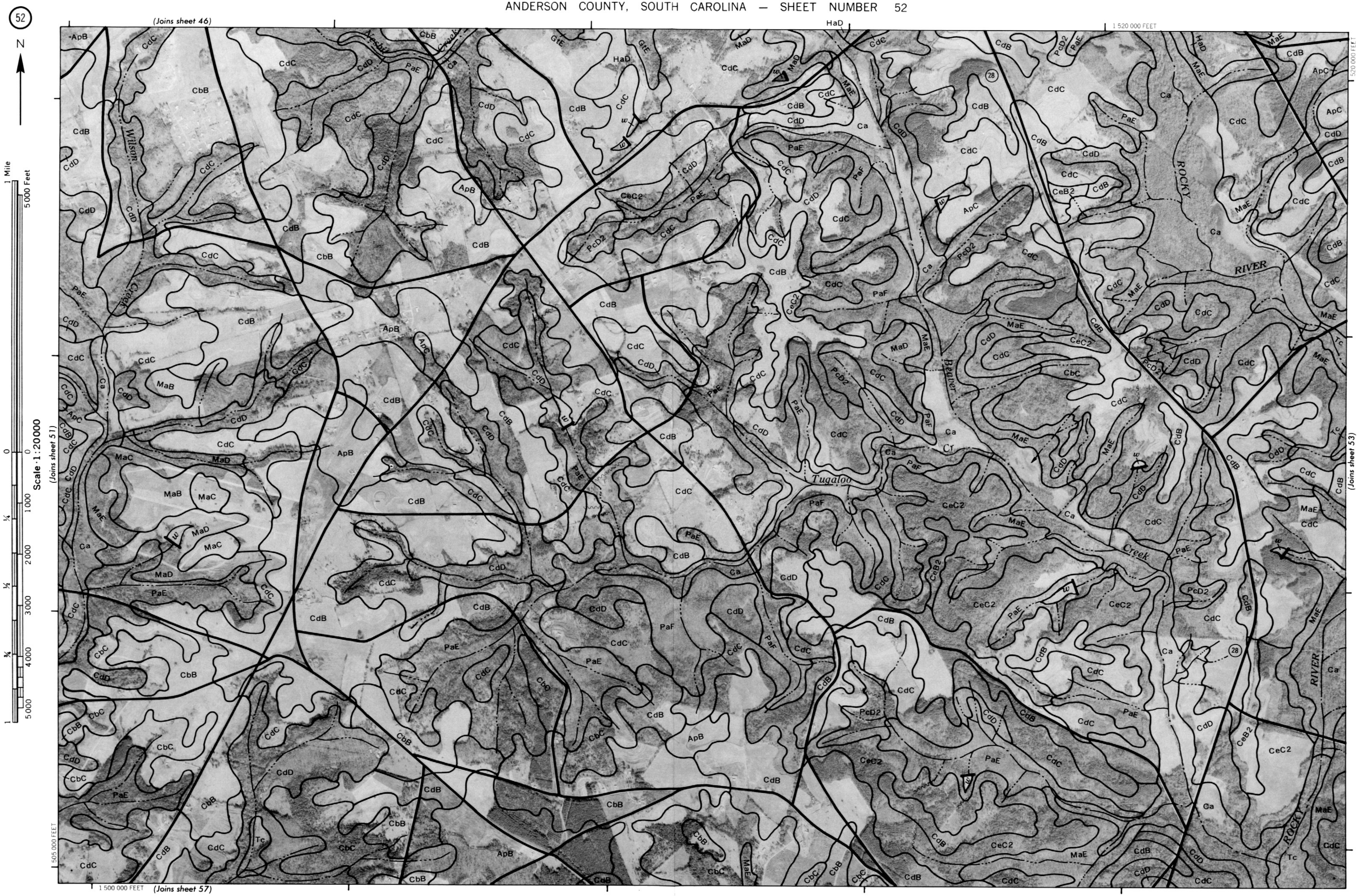
ANDERSON COUNTY, SOUTH CAROLINA — SHEET NUMBER 50

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 50

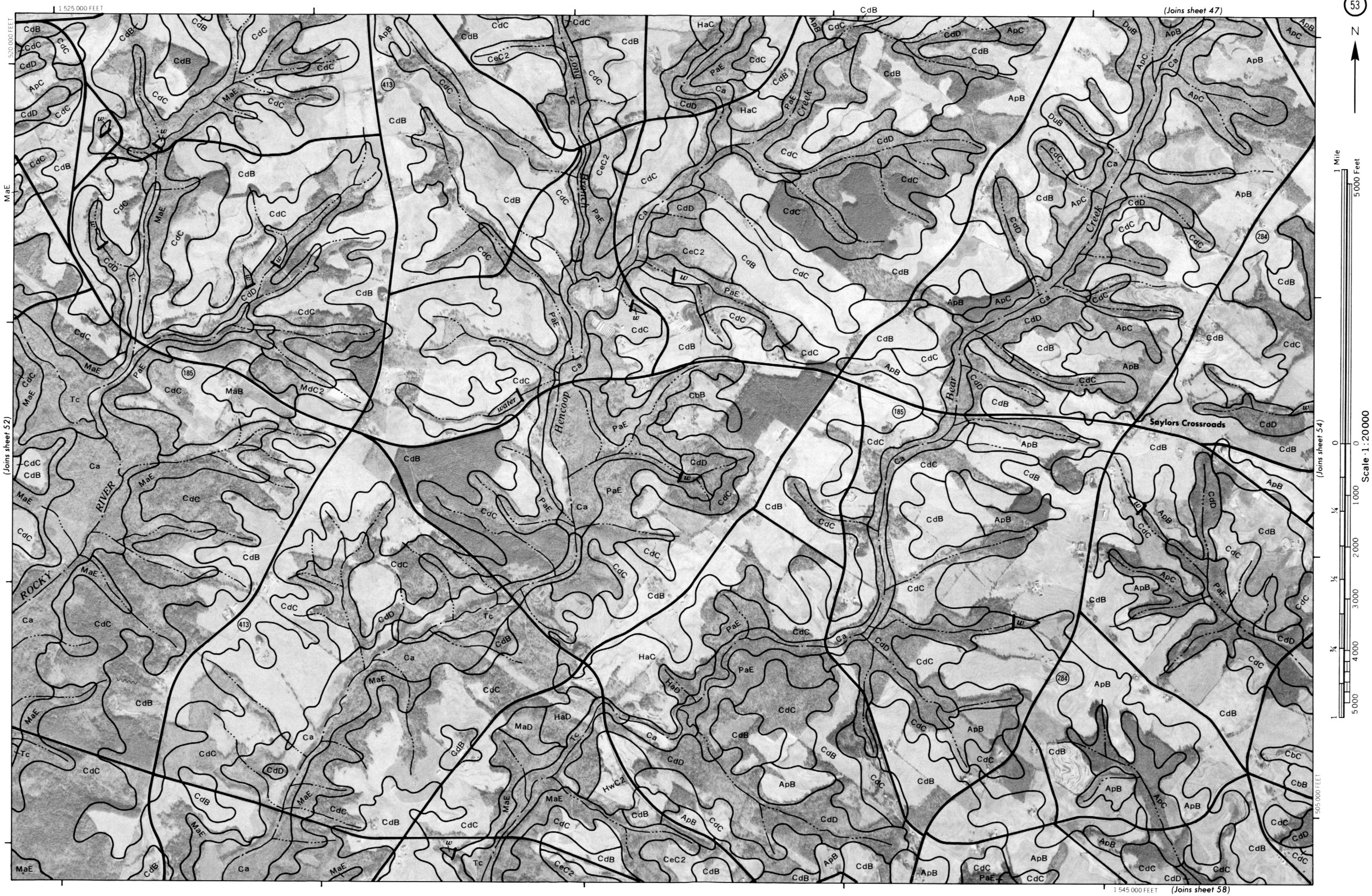
ANDERSON COUNTY, SOUTH CAROLINA NO. 51

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 52



ANDERSON COUNTY, SOUTH CAROLINA NO. 53
This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 55

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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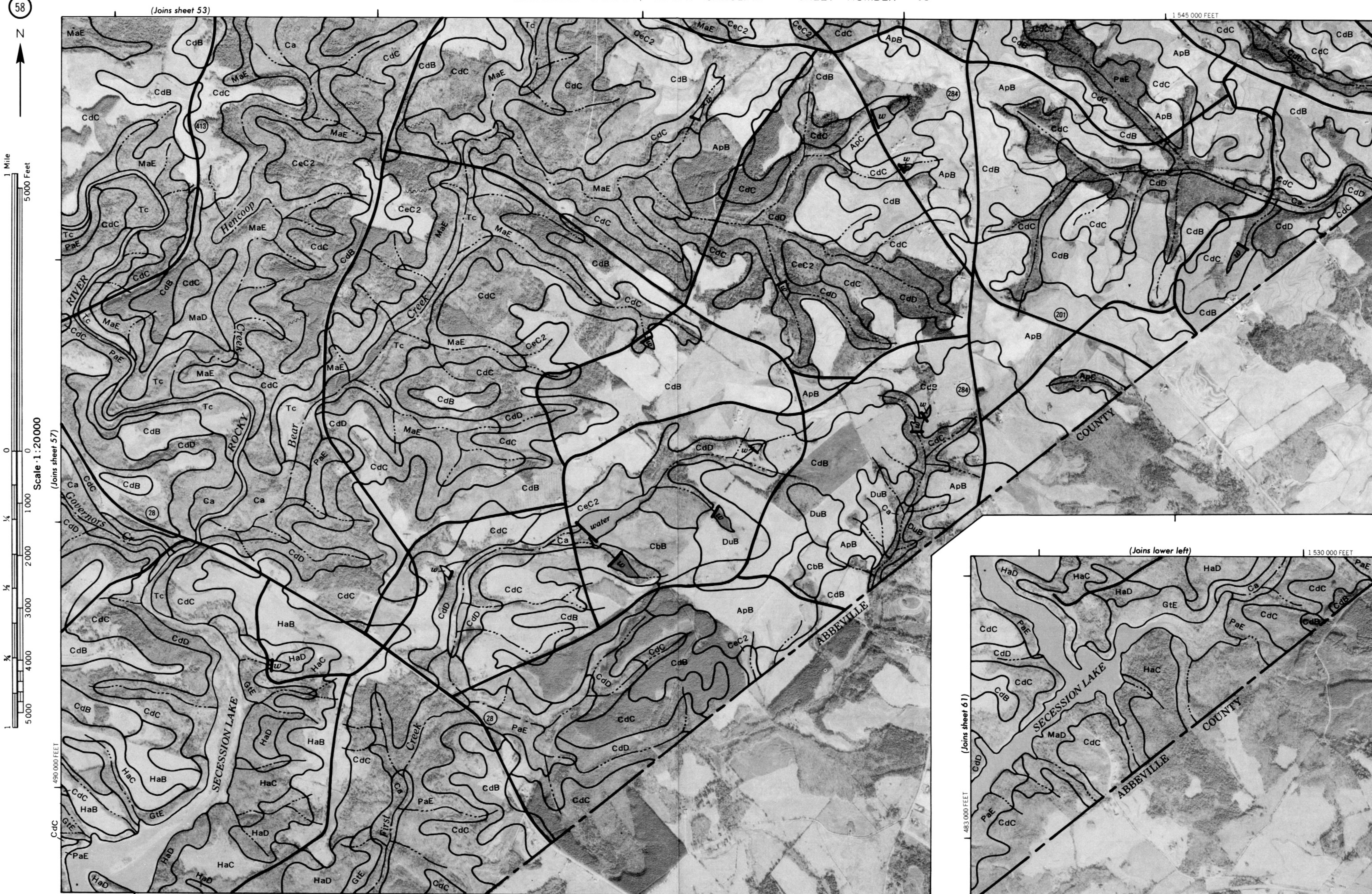
ANDERSON COUNTY, SOUTH CAROLINA NO. 56

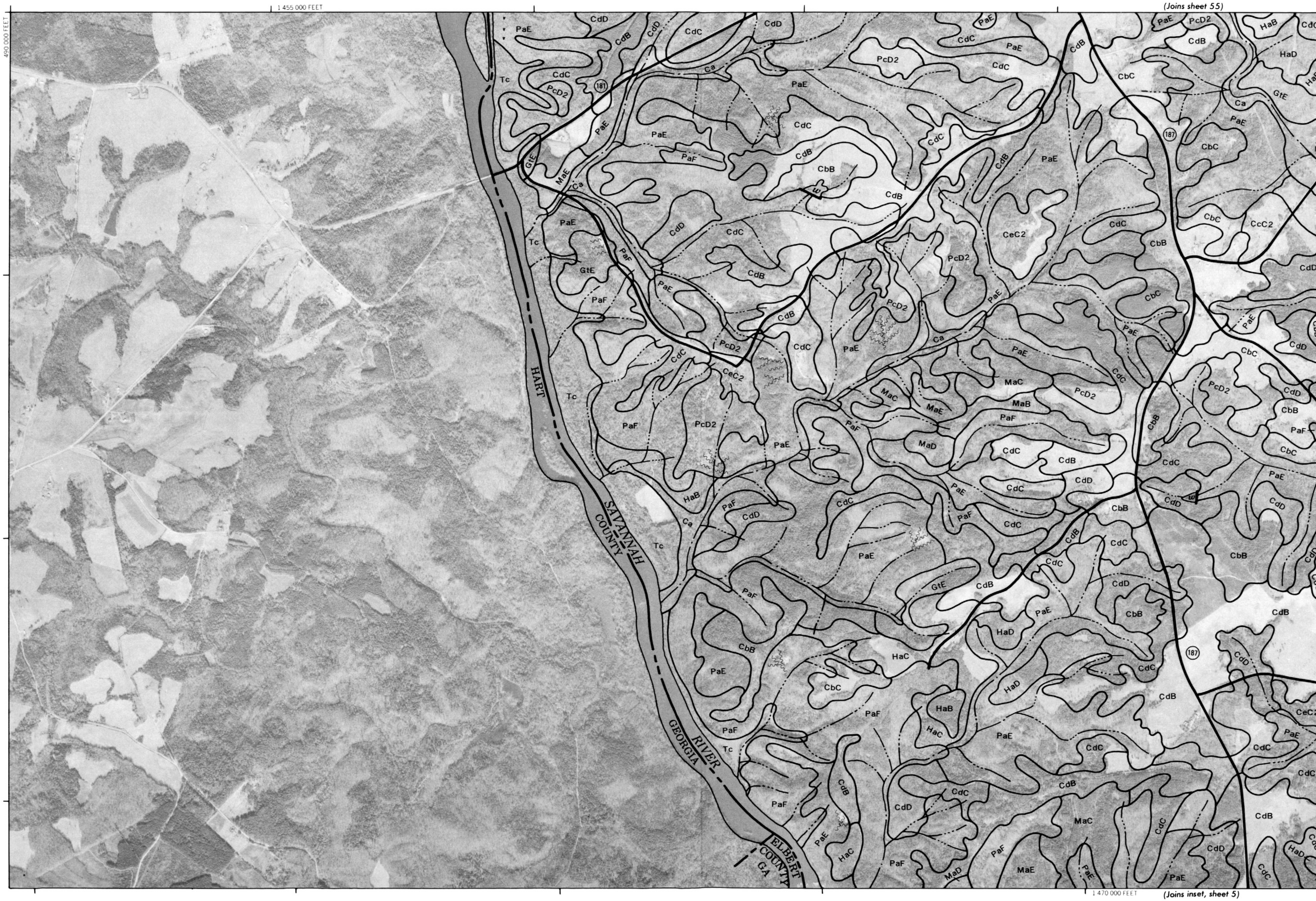
ANDERSON COUNTY, SOUTH CAROLINA NO. 57

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 58



N

1 Mile
5000 Feet
Scale 1:20000
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1

ANDERSON COUNTY, SOUTH CAROLINA NO. 59

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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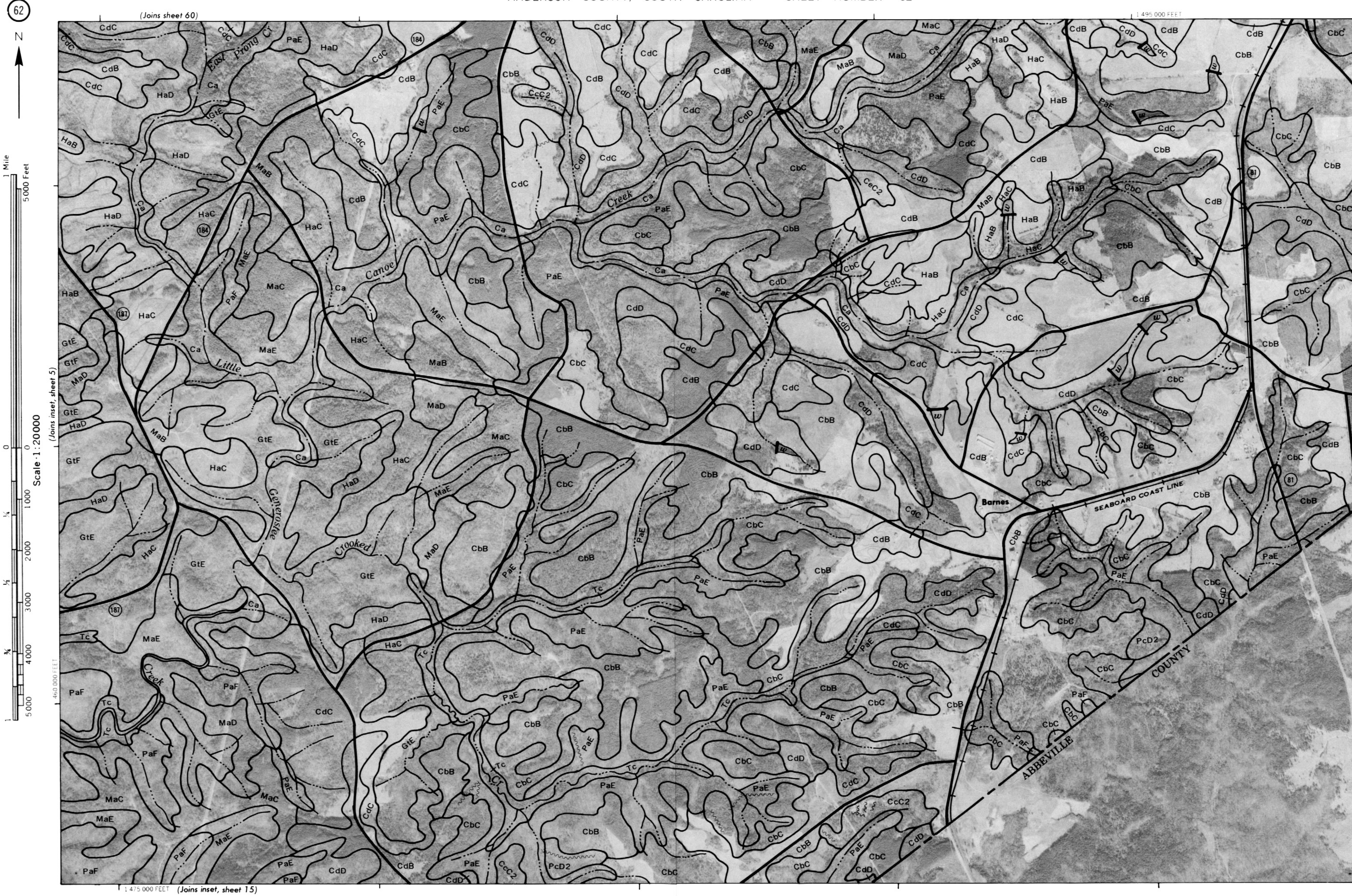
ANDERSON COUNTY, SOUTH CAROLINA NO. 60

ANDERSON COUNTY, SOUTH CAROLINA NO. 61

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

ANDERSON COUNTY, SOUTH CAROLINA NO. 62